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THE IRISH NATURALIST

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY

ORGAN OF THE

Royal Zoological Society of Ireland; Dublin Microscopical Club;
Belfast Naturalists' Field Club; Dublin Naturalists' Field Club;
Cork Naturalists' Field Club

EDITED BY

GEORGE H. CARPENTER, D.Sc., M.R.I.A.
AND
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

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1921.

C.

THE HISTORY OF THE UNITED STATES

BY JAMES MCGOWAN

WILLIAM HARRISON, PRESIDENT OF THE UNITED

STATES, PRESENTS HIS HISTORY OF THE UNITED STATES,
WITH AN APPENDIX, WHICH CONTAINS A HISTORY OF THE
AMERICAN REVOLUTION, AND A HISTORY OF THE UNITED STATES.

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JAN 27 1921

THE IRISH NATURALIST.

VOLUME XXX.

THE RELATION OF SONG TO THE NESTING OF BIRDS.

BY J. P. BURKITT.

THE song of birds may have relation, perhaps, to a number of things besides connubial life, but as the bulk of song is in spring and early summer it is natural to expect and investigate a relation to nesting. Song is not confined to spring and early summer, and on that point I take the liberty of quoting from two articles by Messrs. C. and H. Alexander in "British Birds," May, 1908, and February, 1911. These show the result of an enquiry over several years as to what months in the year each song can be heard in the S.E. of England. They do not deal with the relation of song to connubial life. They note certain relations of song to weather.

What at once strikes a north of Ireland observer is the amount of song which Messrs. Alexander seem to get over there outside the "regular" period. It seems clear to me that we here get nothing at all like it; that song is much more confined to the regular period. The Hedge Sparrow there sings regularly from the second week in September all through the winter, whereas I do not know of its song here before the end of January or beginning of February. Again, with them the Chiffchaff sings some in August and regularly in September, whereas I might hear, perhaps, one bird in August and never one in September. Their

Willow Wrens sing regularly through August ; I might hear the song twice. They note that several species have an autumn as well as a spring song period ; that this is well seen in the Skylark, Pied Wagtail, Creeper, Goldcrest, Chiffchaff, and Willow Wren, less so in Missel-Thrush, Blackbird and Chaffinch ; that the Song Thrush, Robin, and Hedge Sparrow sing all through the winter, and the Wren makes no appreciable break. They do not hold much to the frequent suggestion that autumn singing is from young birds of the year. This is nearly all superior to my district. I should say the remarks apply to us in the case of Goldcrest, Creeper, Robin, and Wren ; in a much less degree as to the Wagtail, Skylark and Song Thrush, and not at all as to the rest.

Messrs. Alexander's "regular" period, where I can check it, is also inclined to last later than ours. Thus they put the regular song of Thrush and Blackbird as ending in third and fourth weeks in July respectively, whereas I would put them at least a month earlier. They end the Chaffinch's regular song in first week of July as compared with mine fully a fortnight earlier. The Meteorological Society divides the British Isles for phenological observations into climatic divisions :—A (S.E. England) to K (N. Scotland) and Messrs. Alexander's district and mine would belong to C and G respectively.

Messrs. Alexander mark, of course, a period of "regular" song as distinct from occasional or fitful song. This regular period is mostly but not always in spring and early summer. Their chief exceptions among the residents are as follows :—

Robin	(Regular period)	..	Fourth week in July to fourth week in June.
Hedge Sparrow	..	..	Second week in September to end of July.
Wren	..	..	All year.
Pied Wagtail	..	..	October and early November, and February to May.
Starling	..	..	End of August to beginning of May.

Then among the migrants they put the following as singing during their entire stay, which I also find :—Swift, Swallow (except on arrival), Nightjar.

But in the case of these migrants, the whole time they are with us might be called the family season, and their song may have reference to the family life. So that we are left with the above four or five residents of which there is the *prima facie* suggestion that their song has no particular relation to family life, being as regular out of the breeding season as in it. Whether it really has or not I have no sufficient data for elucidating. Guarding a certain territory for himself and for a real or desired mate, though the latter pay little or no attention, may possibly be a motive with the Robin and Wren; at least I have reason to fancy so in the case of the Wren. As regards the other above-mentioned species which do in my district give some song in autumn, such as the Goldcrest, Wagtail, Creeper, Starling, and Skylark; or which make in autumn call-notes of more or less frequency such as the Chaffinch, Missel-Thrush, Hedge-Sparrow, and Yellow-hammer—I throw out the suggestion that the motive is sexual, shewn either by antipathy and fighting between the males or an attachment of male to female, this antipathy and attachment waning as winter approaches.

I do not pretend to competence in this subject of song. Also my observations herein may or may not clash with those by others and with what can be gleaned on the subject out of bird books. I had hoped to incorporate such gleanings here, but irregularity in the train service has cut me off from libraries.

The main point of this paper is to show that with at least a certain number of well-known songsters, mating seems to put a brake or a stopper on the song; and that we should have comparatively little song from them were it not for un-mated males and the recrudescence of song where there are second broods.

With the general run of songsters the earlier ones begin singing a good long while before nesting. Thus with the Chaffinch there are about $2\frac{3}{4}$ months between early song and early eggs. This might suggest that mating does not affect the song. But this would be a hasty conclusion. Firstly matches may be made up very slowly, and secondly there is a gradual supply of fresh-starting singers.

The termination of the regular period of song is of special interest to me, because, though I suppose moulting has a good deal to do with it, I find that the termination in some species strikingly coincides with the last of the unmated singers getting mates, thus suggesting that the termination is due to mating. I regret I know nothing about moulting, but if it is moulting which stops the song, does moulting take place later in S.E. England than here, inasmuch as the termination seems later there? (I may remark about this termination, that amongst all the songsters as far as I know (including Corncrake) when the song has so declined as to be no more heard in ordinary day time, it may still be heard in early morning.)

I have culled the following list from Messrs. Alexander's papers, showing the end of some of their "regular" periods, remembering that occasional song may continue with them two or three weeks later, such as in Starling, Lapwing, Missel-Thrush, Goldcrest, Chaffinch, Whitethroat. Irish observers may like to compare with them.

Begin. of May	Starling	Mid. July	..	Whitethroat (g)
Mid. May ..	Lapwing			Sedge Warbler
Fourth week May	Missel-Thrush			Grass Warbler
Begin. June ..	Great, Coal, and Blue Tits	Third week July		Song Thrush
Mid. June ..	Creeper			Linnet
Late June ..	Cuckoo	Fourth week July		Blackbird
End June ..	Goldcrest			Chiffchaff
	Robin	End July ..		Hedge Sparrow
	Meadow Pipit			Reed Bunting
	Willow Wren			Skylark
	Corncrake			Martin
	Whinchat	Mid. August ..		Lesser Redpoll
First week July	Chaffinch	Fourth week Aug		Yellow-hammer
	Sand Martin	End August ..		Greenfinch
Second week July	Gardin Warbler	End September		Swallow
		Begin. October		Wood Pigeon

For an individual observer to set himself to investigate the relation of song to nesting, and to cover any considerable number of species, is rather a "tall order." But, perhaps, even such more or less tentative results as have been obtained by my observations may be worth recording. They may help as a basis for others to amend or extend. The study needs much persistence and includes many

disappointments. Besides, one observer may have very poor chances and much labour over a species not common in his neighbourhood, which another can study from his hall-door. The process requires for each species that the observer should note a number of separate male birds, preferably from the very beginning of their season ; note their song, if any, and then watch whether any individuals stick sufficiently to one site or are sufficiently isolated from others, or in some other way have their individuality identified. Each of such birds has then to be watched to see if he gets a mate, and the relation of his song thereto, and throughout the subsequent family life. But will the pair remain at the site ? Will you find the nest ? Will the nest be deserted ? Will a parent or the nest be destroyed ? After these risks will you have enough cases left to judge by ? In my experience the odds are that when you have got as far as the nests, at least half of them and probably two-thirds will come to a bad end. Rats, hawks, cats, and boys are I suppose the cause of most tragedies, but some evil spirit will lead a farmer to cut the only clump of weeds or bit of hedge you want left, or lead a miles-man to clear the brushwood off your special bit of railway bank, or the turf-cutter to select your special spot on the moor. I find such a large proportion of my ground-built (or near ground) nests destroyed that I imagine my footsteps must be followed up by rats at night ; or can there be general destruction on such a scale ? Again, desertion is sometimes mysterious, as for example in two cases this year where a pair of Yellow-hammers and another of Garden Warblers deserted the first nest with eggs, and quickly made new ones within four or five yards. The first nests had not been fingered nor the birds disturbed by me.

My observations for this article more particularly refer to the Chaffinch, Yellow-hammer, Chiffchaff, Willow Wren, Lesser Redpoll, Sedge Warbler, Grasshopper Warbler, and Greater Whitethroat.

Probably no hard-and-fast rule binds all the males of a species in their singing, and indeed anything I lay down herein is only meant to be tentative. I wish this to be understood without repeating it.

1. The songsters of the above species sing strongly before mating and as if to get a mate because,
2. Some practically cease to sing after getting a mate. (Perhaps only true of the Yellow-hammer. I have not studied the Blackbird, but I notice that an observer in "British Birds," September, 1920, incidentally mentions that a Blackbird whose song had previously been almost incessant, was much reduced after a mate arrived).
3. Some practically cease to sing after the female begins to sit. (Generally true of Chaffinch, Willow Wren, Grasshopper Warbler, White-throat.)
4. All have either ceased to sing or sing very much less while the female is sitting. (Chiffchaff doubtful.)
5. A male otherwise silent may sing a bar or two while the female is off the nest.
6. There is no, or little, song when rearing brood. (Except Chiffchaff and Redpoll trill—see note on Redpoll below; Willow Wren sometimes sings.)
7. As might be deduced from the above, *any strong continual singer is mateless*. (Except perhaps Chiffchaff and Redpoll.) And these mateless males are further distinguished by their bold advertisement of themselves.
8. Mateless males may sing on for weeks or months before mating; not changing their site, and in some cases hardly even changing their particular perch.
9. Thus the bulk of the song of these species, except Chiffchaff and Redpoll, is from birds before mating. And its prolongation in any strength during several months is mainly due to a supply of unmated males, coupled with the recrudescence of song where there are second broods.

50. One common notion about bird song seems, at least in these cases, to be just the one thing we can safely deny, namely, that the male sings chiefly to please a sitting mate.

The Greater Whitethroat is the most interesting example of the above. His song ceases almost entirely shortly after the nest is begun, and as the nesting is started more quickly after arrival than any bird I know we should have very little of this song were it not for the supply of mateless males. As the weeks pass these latter acquire mates, but great numbers of them may go on mateless and singing past the end of May and all through June and well into July. Whenever one gets a mate he almost at once ceases to be heard. But if some accident occurs to the nest or the female, one hears the male start singing again. A greatly added interest attaches to the mateless males because they occupy their time building a series of cock nests. Both parents seem to feed the young equally.

The mated Grasshopper Warbler seems to cease early to sing, and does not sing again till after the first brood is fledged. Both parents seem to feed the young equally. A certain prolongation of the earlier song seems to be due to still mateless males.

The Garden Warbler will either stop singing altogether or sing seldom and low after the female begins to sit. (There may be some exceptions to this.) He may from time to time give a few notes when she is off the eggs.

A beautiful low rendering of his song, almost a whisper, is a certain indication of the close proximity of the nest and probably fresh eggs. Any strong not-shy singers after early in June will probably be found to be still mateless. I have watched such birds, which do not give the usual mated alarm, and with which I could detect no female. These provide a certain prolongation of the song. But such are few and the main run of the song of this bird is the shortest I know, lasting barely a month in my experience. A lot of small beginnings of nests are found in the bushes around any of these songsters, and are probably made by the male. I only once caught such building in the act, but at that time I was not aware of the habit and so did

not notice which sex did it. Both parents feed the young, but I think the male does it less.

In the case of the Willow Wren the first strong well advertised song gets low and less frequent very shortly after a mate arrives. With many males it may cease altogether, and not a note be heard till the brood is hatched. Both parents feed the young, the male doing it much less. He may at that time sing at intervals but the song soon stops. It is nearly safe to say that all Willow Wrens singing on loudly and steadily are mateless. In my article of September, 1919 (*supra*), I gave examples of such birds remaining even up to twelve weeks mateless.

As to the Lesser Redpoll, my observations were on the trill and not on the alleged early song. I confess unacquaintance with the latter, and therefore, perhaps, the trill should not stand with these other songs. It belongs more properly to that large class of notes which imply the accompanying presence of the mate or family, for it seems to be almost entirely made in his flights with the female. I have not heard it when she was sitting. He is a very faithful mate, accompanying her on her flights for building material and again when she goes for food for the young, trilling all the way. And again he does the same when the young are fledged and being fed up in high tree-tops. The trill is thus heard on even towards the end of July. The high course of flight and the big circles taken by this small bird make it very difficult to locate, though heard all about you. I have not seen the male feeding the young.

In the case of the Chaffinch it would be rather daring to suggest rules about such a well-known bird, from the study of only a few cases. But in those few the male certainly stopped singing when the female began to sit, and did not sing again till that brood was done with. Many of these birds, probably yearlings, plainly remain unmated till well on in the season and thus provide a fairly steady volume of song. But I have noticed a distinct period of little or no song such as would be accounted for by the gap between the main run of first and second broods. Both parents feed the young.

The Yellow-hammer's song is a particularly popular melody as he remains perched up on a telegraph wire or bush or tree, and lasts throughout the entire day. Many a time in the past have I waited for some sign of the female, or other indication of a nest, but without avail. I know now that it is nearly certain that such a singer means there is no mate. I have never detected such a singer to have a mate. And conversely I have never heard the male of a known mated pair sing, even in the earliest stages of matehood, unless a very odd scrap. The Yellow-hammer's mated note is essentially the single note, which, though not loud, carries a remarkable distance. The tail bobs down at each note so that you can know he is making it even if too far to be heard. The unmated bird may use this note also to some extent, but the odds are that a male making this note and not singing (proper) is mated.

The Yellow-hammer begins to sing early in the year, and makes himself noticeable by his song from a perch as well as by his bright colours; while hardly any females are noticed for a long while, probably from the absence of any such advertisement.

Later on two or three males along with one female will be seen making long circular flights; apparently some method of selection. Frequently two or more males will be perched not far from a female; the true mate will not be singing while the others will. The building female may take long flights with material and the male may accompany her. He will probably make the single note during her stay about the nest. (I have in several cases seen the male carrying building material—once in each case—but how much I do not know.) He will either be quite silent and unnoticeable during the incubation (in which he is said to take part) or he may maintain long periods of the note perched fairly near at hand. If some accident happens to the female, singing may re-commence. His part in feeding the young is variable or *nil*. He then usually accompanies her on her flights for food, and may possibly give a bar or two of song (proper) while waiting for her to return. In any anxiety the crest of either bird will probably erect. I have had a number of examples of

unmated Yellow-hammer males singing from almost the one perch for at least six weeks ; and in some cases I think it was the same bird for three months. I left one such bird still singing on August 5th. These birds may sing at intervals of ten or fifteen seconds throughout almost the entire day. The "regular" song period of this bird is one of our longest, being $5\frac{1}{2}$ months, ending mid-August. Does it not moult very late ?

The renewal of song for second broods of certain species can be noted in individual examples, and more easily in isolated pairs, but I also think I can detect a marked general recrudescence round about dates which would correspond with second broods. Thus I fancy I have marked it for our Chaffinches about the last week in May ; for Snipe in first week in June ; for Yellow-hammers in beginning of June and again at mid-July ; for Sedge Warblers at end of June ; for Grasshopper Warblers at beginning of July. But we might ask why a male who has a mate should re-sing, if the purpose of song be to get a mate. Well, the unmated males, who get mates so late that the latter can hardly be late arrivals, perhaps get females who have left their first husbands. And thus the male who has a mate may sing after the first brood for fear of losing her.

But in any extended study of this subject the question will arise : what *is* song ? Is that easy of definition ? Some sounds may be denoted as not only a song but also an alarm or a mate's call or a family note, or a general company note. The Lapwing's note seems to fulfil all these purposes. Is it a song ?—and is the Tern's and even the Blackheaded Gull's not one, though the use of the note among these three seems to fairly correspond ?

In some cases even the Warblers' song comes in as an alarm in addition to the more regular alarm note. Commonly so in the case of the Sedge Warbler, but also in the Grasshopper Warbler. The Whitethroat sometimes blurts out a peculiar whortling variation of his song if you are near the nest ; and the Chiffchaff may insert a bar or two of song amongst the ordinary alarm notes.

NOTES ON LEPIDOPTERA IN 1920.

BY REV. W. F. JOHNSON, M.A., F.E.S.

THE past year was not a good one for Lepidoptera, nor indeed for insects in general, for it was on the whole a wet year, and we had practically no summer. There were fine days, it is true, but they were, like angels' visits, few and far between. It could not be expected under such depressing weather conditions, that butterflies should abound, and they did not.

Usually the first fine days at the end of March or beginning of April are heralded by the appearance on the wing of the Small Tortoiseshell Butterfly, but this year the first to appear on the wing was the Speckled Wood, and it did not show itself till April 24th, nor was this surprising for I think last April was the worst April I can remember. On May 4th the Green-veined White put in an appearance, and on the 7th I saw the first Small Tortoiseshell and the first Orange-tip. On the 15th May I was agreeably surprised to see a battered Peacock Butterfly in my flower garden, the first I had seen here in the spring, all the other occurrences having been in the autumn. I hoped it would lay its eggs here and that I should have the pleasure of seeing its family in the autumn, but evidently the nettles were not to its taste, as none materialised.

At Drumbanagher Vicarage, however, my young friends, Misses Phyllis and Doris Nelson found a large family of larvae and succeeded in rearing many fine specimens of this handsome butterfly.

In mid-June I went to Portnoo, Co. Donegal, and was there for almost a month, but the weather was no more propitious there than here, and I met with but few Lepidoptera.

The following butterflies were observed:—Large White, Peacock, Wall, Meadow Brown, Small Heath, Green Hairstreak, Small Copper, Common Blue, and Little Blue. A few moths also turned up. As Mrs. Johnson and I were walking across some boggy ground, she picked up a

beautiful fresh female of *Diacrisia sannio (russula)*, the first of this sex I had met with ; we had caught males at Portnoo before but no females, so I was very pleased at this capture. The moth was sitting low down on the grass and its detection does credit to Mrs. Johnson's keenness of sight. I found a nice specimen of *Boarmia repandata* sitting under a window sill, and took *Miana fasciuncula* on thistles on the sandhills, the latter were rather worn and faded. On almost the last day of our visit I saw among herbage on the roadside a little black moth with white spots on its wings. I netted it and it proved to be *Eunychia octomaculata*, a species I had not previously met with. This ends the meagre list from Portnoo.

After our return home, Mrs. Johnson and I were in Newry on July 30th and her sharp eyes detected *Bryophila perlata* on the wall of one of the markets ; and on September 10th she pointed out to me *Luperina testacea* on a shop window in Sugar Island, Newry. This specimen was larger and darker than usual. In July I gathered some umbels of Hog-weed on which larvae were feeding, these pupated and from these pupae *Depressaria heracleana* emerged at the end of August.

August 27th was one of the few really fine days we had, and I took advantage of it to walk round by fields with my net and picked up a nice *Pyrausta aurata*, and on the following day I found *Hydroeciella nictitans* on Ragweed.

On September 15th I walked down the canal bank to look for Sawfly larvae on some bushes of *Salix pentandra* and found larvae of *Dicranura vinula* and *Notodonta ziczac*. On my way home I saw a nice fresh specimen of the Red Admiral. On September 29th I saw three more in another direction, and on October 2nd had the pleasure of seeing this beautiful butterfly in my flower garden. On November 6th my terriers found a nest of half grown rats under a heap of leaves and sticks. To help the dogs I turned over the heap and out of it flew several small light-coloured moths. They were very sluggish, and having a killing-bottle in my pocket I had little difficulty in securing specimens. On examination I found that they were *Depressaria arenella*. This seems a late date for these

moths to occur, but Stainton ("Manual" ii., p. 317) says that nearly every *Depressaria* hibernates.

I was greatly struck this year with the hardness of the Speckled Wood Butterfly. It was the first to appear and the last to disappear. Every gleam of sunshine brought it out, and I even saw it on the wing in drizzling rain. This makes its disappearance from parts of the south and south-east of England more remarkable. Mr. Meyrick many years ago (*Ent. Mo. Mag.* 1890, p. 297) remarked on its disappearance from the neighbourhood of Marlborough and I have this year been told by a correspondent that both it and the Wall Butterfly have disappeared from Kent, and I believe the same holds good of other localities where both used to be abundant.

Poyntzpass.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 10.—The Club met at Leinster House.

H. A. LAFFERTY (President) exhibited microscopical preparations showing the spermogonial and aecidial stages of *Melampsora Lini* Desm. as found by him on young flax plants in Ireland. These two stages of the fungus were first recorded by Fromme who, in 1912, found them on flax plants in the United States of America, and they have not hitherto been recognised outside that country.

PAUL A. MURPHY showed dividing nuclei in the swarm-spores of a myxomycete (*Lycogala*) and, by way of comparison, similar nuclei in roots of bean and Galtonia.

W. F. GUNN and PROF. J. A. SCOTT exhibited preparations showing the "streaming" movement of the protoplasm of *Bodhamia utricularis*, a species of Mycetozoa. The movement was observed to continue in one direction for 80 or 90 seconds, then to be reversed for a somewhat shorter period, the longer period always being in the direction in which the plasmodium was advancing. In about twelve hours after the meeting it was observed that the plasmodium had gathered together in little heaps on the rotten wood (the material on which it was feeding), sporangia had formed, and spores with traces of capillitium threads were already discernible in the interior of the sporangia.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 16.—First meeting of the winter session in the Museum, College Square North, the President (S. A. BENNETT, B.A., B.Sc.) gave an address on "Water Plants." Before the proceedings commenced references were made to the recent death of Sylvanus Wear, a member of many years' standing, and the Club's librarian and herbarium curator, a vote of condolence, proposed by the President, and seconded by Mr. J. A. S. Stendall, being passed in the usual way.

In his address the President stated that in addition to the difficulty of obtaining an adequate oxygen supply there was the difficulty of raising the flowering spike out of the water into the surrounding air. The methods adopted by water plants in solving this problem afforded many instances of remarkably efficient adaptations to external conditions. The luxuriant growth of water plants was discussed, and the history of the spread of the Canadian Weed in the British Islands was given. This pest, which had cost canal companies many thousands of pounds, was first reported from Waringstown in 1836, a doubtful honour to County Down. The phenomenon of heterophylly was discussed, the different forms of leaf exhibited by one and the same plant could hardly be referred to the direct action of the environment, as both submerged leaves and floating leaves could already be distinguished in the growing leaf-bud which was forming under water. In future much more weight would have to be given to the part played by descent in the determination of leaf form and less stress laid on the theory of adaptation to external conditions. The address closed with a review of some of the outstanding difficulties of the theory of natural selection, as illustrated by the bladderwort (*Utricularia*) and the evolution of the buoyant bud.

The address was freely illustrated by a fine series of lantern views, and at its close was supplemented by some very interesting remarks by Professor Gregg Wilson.

The Hon. Secretary also presented his report as delegate to the British Association meeting, held in Cardiff during August last.

NOVEMBER 30.—Sectional meeting in the Museum, College Square North. A paper on "Rats: Their Habits and Economics" was read by Mr. J. A. S. STENDALL. After detailing the position of rats in the animal kingdom, the author gave a brief history of the introduction of the Black Rat and its more formidable cousin, the Brown Rat, into Great Britain; these two animals are without doubt the most highly organised members of their family and the most successful of mammals. The so-called Black Rat is not always black, but consists of three distinct sub-species, the Black Rat proper, the Alexandrine Rat, which is brownish-grey, and the Tree or Roof Rat, which is reddish-brown. The black form of the Brown Rat in Ireland, first described by Wm. Thompson in 1837 as a distinct species, is apparently increasing in numbers. The damage caused by rats was referred to. Their destructive and offensive habits mark them as among our deadliest enemies.

The address was illustrated by numerous specimens, in the examination of which much interest was taken. A short discussion followed the reading of the paper, in which the President, G. Reilly, and the Hon. Secretary took part.

NOTES.

ZOOLOGY.

An Aberration of *Argynnis aglaia*.

I send a description of an interesting aberration of *Argynnis aglaia* which my son, W. G. Crawford, caught among the sand-hills bordering the Bush River at Portballantrae, Co. Antrim, at end of August, 1919.

Female. Expanse $2\frac{1}{4}$ inches. UPPERSIDE.—*Fore wing* mostly black with a fulvous spot about middle of the cell. Basal area dusky brown, terminal area fulvous crossed by thickened black veins. Cilia cream except where interrupted by the black veins. *Hind wing*. Basal area dusky brown; fulvous patch stretching from costal margin across cell with halved black spot superimposed on it; outer area mostly black, dusky fulvous showing only in the interspaces. Cilia as in fore wing. UNDERSIDE.—*Fore wing*, fulvous with thin black bar across base of cell, large roundish black spot in middle of cell and broken black bar across apex of cell; disc almost wholly black with veins fulvous, terminal margin fulvous with subterminal brown line marked with silvery blue on the inner side in interspaces 5, 6, and 7. *Hind wing*, ground colour green marked by usual silver blue spots, mostly edged with black. The discal spots in interspaces 5, 6, and 7 are entirely black. Yellowish spots in interspaces 2, 3, and 4 between the discal and subterminal rows of silvery spots.

WM. CRAWFORD.

Belfast.

Return of the Golden-crested Wren and Long-tailed Titmouse.

As stated (*Irish Nat.* vol. xxvi., p. 118) the severe winter of 1916-17 practically, if not entirely, exterminated the Golden-crested Wren and Long-tailed Titmouse in this district. In regard to the former species, after the lapse of about a year a few appeared again, and now this bird has about regained its former status. Until November, 1920, the Long-tailed Titmouse was not noted here, but I am glad to report that on the 24th of that month Mr. C. B. Horsbrugh saw a pair in his garden, and on the following morning I observed them also.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

Migration Season of the Corncrake.

I dare to suggest that out of all the migratory birds which come to the British Isles to breed, there is one which does us the honour of coming to the Emerald Isle distinctly earlier than to England—namely, the Corncrake. My grounds are the following :—

1. A record of observations during 20 years (1877-1896) from "some 15 stations mainly in England" published in the *Natural History Journal* gives the average first arrival of the Corncrake as the 1st of May.
2. The average taken by me in Fermanagh for the 14 years 1907-1920 is the 20th April or 11 days earlier.
3. In 11 of these 14 years the variation was not more than 2 days from the 20th, which is remarkable, and which shows the seriousness of the average 11 day earliness in (2).
4. Taking the mean of the first arrivals with me of 11 migrants during 6 to 13 years, exclusive of the Corncrake, I find this mean to be 3 days later in Fermanagh than the *N. H. J.* mean for the same 11 birds. In other words we are at least 3 days later on an average than England. This 3 days should then be added to the 11 in (3), making the Corncrake really 14 days earlier here than if it was on a par with the other birds.
5. During the past 6 years 1914-1919 observations have been tabulated in the Phenological Report of the Meteorological Society. The average of Corncrake arrivals therein (excluding the Scotch to make my argument fairer) is the 4th of May. Whereas the Irish records therein taken by themselves average 22nd-23rd April or 11½ days earlier.

For counter argument to my proposition,

- (a) It might be said that my own observations may have been more alert and therefore earlier than the average observer. But what about the other Irish observers? It needs no great alertness to hear the Corncrake. If the 11 days in (3) is to be reduced for alertness the 3 days in (4) must be increased accordingly.
- (b) The Irish stations in the Phenological Report are very few; but they are corroborative.
- (c) In this Report there are few observations from south-west England. That area should, perhaps, be our chief competitor. But I see no evidence from the tables that the south of England is earlier than the Midlands. Does this argue their unreliability?
- (d) What has lighthouse research to say on the matter?

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T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A., Scot.,
THE MUSEUM, HULL;

AND

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NOTES ON SOME IRISH ENTOMOSTRACA.

BY ROBERT GURNEY, M.A.

THE following notes on Entomostraca are the result of a week's stay at Malahide (Co. Dublin) at the end of September, 1920. During this time I paid visits to Howth and to Newbridge, and have therefore arranged these notes under the heading of these localities in order to bring into prominence the difference in the conditions investigated.

I. MALAHIDE.

There is almost an entire absence of fresh-water pools in the neighbourhood of Malahide, but it is an excellent locality for the study of estuarine species, and two fresh-water species of considerable interest were found.

In the demesne of Malahide Castle are some fine old Beech trees, and the water collected in hollows at the foot of these trees, or at the junction of branches with the stem was investigated, with the result that in one of them were found a few specimens of *Moraria varica* (Graeter). This is a Copepod resembling in many respects *M. arboricola* Scourfield, which was discovered by Mr. Scourfield in similar situations in Hornbeams and Beeches in Epping Forest, and has since been found to be common in Beech tree holes in the New Forest; but it is a smaller species, and quite distinct. It was originally found by Graeter in caves in Switzerland, but has also been taken by him and by Chappuis in rotten wood, and by Mr. Scourfield in a tree-hole in Epping "Lower" Forest. It is probably therefore a true woodland species. Its occurrence at Malahide seems to me to indicate that the Beech wood here is a relic of a once more extensive forest. Other holes in these trees were either altogether barren or contained no Morarias, but in two of them the following species were found:—

I.

Canthocamptus pygmaeus.
Candonia candida.
Cyprina ophthalmica.

2.

Canthocamptus lucidulus.
Cyclops fimbriatus.
Chydorus sphaericus.

Brackish pools by the estuary were found to be rich in Entomostraca, among which the following are worth mention :—

Halicyclops aequoreus Fisch.
Nitocra typica Boeck.
Nitocra spinipes Boeck.
Mesochra rapiens Schmeil.
Tachidius littoralis Poppe.

Nitocra typica also occurred in the estuary itself. It appears to be a rather rare species preferring more saline water than *N. spinipes*, although sometimes (as on this occasion) living in company with it. *Mesochra rapiens* (= *M. hirticornis* Scott) has, so far, only been found in one locality in Ireland—Clare Island (Scourfield). It is characteristic of water of very low salinity, and occurs even in perfectly fresh water. I was not able to analyse the water of these Malahide pools, but, to judge by the situation and nature of the fauna, the salinity must have been high—at least 12 grms. chlorine per litre.

In a small trickle of fresh water draining into the estuary was found, in company with *Nitocra spinipes*, a variety of *Cyclops languidus* which differs so much from the type as to constitute apparently a distinct species. This form has only 11 joints in the first antenna, and differs from *C. languidus* in the form of the swimming legs, in which the terminal joints are scarcely longer than broad, while the terminal spines of the inner branch of the fourth foot are of very unequal length. There are a number of forms of Cyclops closely related to *C. languidus*, to several of which specific names have been attached, and a careful revision of these forms is much needed. I am acquainted with two of these varieties in addition to that above mentioned, neither of which seems to agree with published descriptions, and must defer a detailed description of these forms to a future occasion.

2. HOWTH.

High up on the hill of Howth is a marshy spot with a small deep pool, or reservoir, in which *Cyclops prasinus* and *Bosmina longirostris* abounded, while *Canthocamptus pygmaeus*, *Alonella nana* and *Alona affinis* were found in adjacent pools. This depression seemed, from the nature of the flora and fauna, to drain more or less calcareous soil, whereas a pool in a quarry higher up the hill appeared to be of a different character. Here occurred *Cyclops languidus*, *C. bisetosus* and *Moraria brevipes*, the last being, I think, an addition to the Irish fauna. *M. brevipes* is a rare British species living only in lime-free water and generally in Sphagnum moss. It has been recorded from several localities in Scotland, from Epping Forest, and occurs in heath pools in Norfolk.

3. BOG OF ALLEN AT NEWBRIDGE.

I was only able to visit the fringe of the bog and to make a few collections in small Sphagnum pools here and there, so that the results were disappointing and scanty. These small pools, sometimes quite filled with Sphagnum, seem to have much in common with the Sphagnum bogs of the New Forest. The fauna is remarkably poor, the only species found to be common at Newbridge being *Acantholeberis curvirostris*. A few specimens of *Moraria brevipes* were taken from one pool, but the most interesting capture was *Cyclops venustus* Norman and Scott, a species which was described in 1906 from specimens collected on Exmoor by Canon Norman. It has since been found by Mr. Scourfield on Exmoor and Dartmoor also. This species is closely allied to *C. capillatus*, and is, perhaps, to be regarded as a variety of it, but it is readily distinguished from that and other species by the coarsely toothed margins of the abdominal segments and by the surface markings of the integument. The surface of the abdominal segments is ridged, and along these ridges run rows of minute markings which are apparently pits such as are found in *C. diaphanus* Fisch. The surface of the cephalothorax is covered by delicate marking which gives the appearance of a complicated

wrinkling of the cuticle. The swimming legs agree with those of *C. capillatus* except in small details, and the fifth leg is identical.

LIST OF SPECIES FOUND.

A = Bog of Allen. M = Malahide. H = Howth.

<i>Simocephalus vetulus</i> O. F. M.—A.	<i>Cyclops prasinus</i> Fisch.—H.
<i>Bosmina longirostris</i> O. F. M.—H.	<i>C. fimbriatus</i> Fisch.—A. M.
<i>Acantholeberis curvirostris</i> O. F. M. —A.	<i>Tigriopus fulvus</i> Fisch.—M.
<i>Alona affinis</i> Leyd.—H.	<i>Dactylopus tisbooides</i> Claus.—M.
<i>A. guttata</i> Sars.—A.	<i>Idya furcata</i> Baird.—M.
<i>Alonella nana</i> Baird.—A. H.	<i>Canthocamptus lucidulus</i> Rehb.—M.
<i>A. excisa</i> Fisch.—A.	<i>C. pygmaeus</i> Sars.—A. M. H.
<i>Chydorus sphaericus</i> O. F. M.—A.	<i>Moraria brevipes</i> Sars.—A. H.
<i>Eurytemora lacinulata</i> Fisch.—M.	<i>M. varica</i> Graeter.—M.
<i>Cyclops languidus</i> Sars.—A. H.	<i>Nitocra typica</i> Boeck.—M.
<i>C. languidus</i> var.—M.	<i>N. spinipes</i> Boeck.—M.
<i>C. viridis</i> Jur.—A.	<i>Mesochra rapiens</i> Schmeil.—M.
<i>C. strenuus</i> Fisch.—H.	<i>M. lilljeborgii</i> Boeck.—M.
<i>C. venustus</i> Norm. and Scott.—A.	<i>Tachidius littoralis</i> Poppe.—M.
<i>C. bisetosus</i> Rehb.—H.	<i>T. brevicornis</i> Lillj.—M.
<i>C. nanus</i> Sars.—A.	<i>Cytheridea torosa</i> Jones.—M.
<i>C. speratus</i> Lillj.—A.	<i>Cythere lutea</i> O. F. M.—M.
	<i>Candonia candida</i> O. F. M.—M.

BIRDS' SONGS AT HILLSBOROUGH, CO. DOWN.

BY NEVIN H. FOSTER, F.L.S., M.B.O.U.

APROPOS of Mr. J. P. Burkitt's article (*ante* pp. 1-10) I append a list extracted from my note-books showing the months in which I have heard a number of birds' songs here during the years 1910-1918. Unfortunately the precise dates had not been noted and consequently a bird might have been credited with singing in a month in which its song had only been uttered on the first or the last day of the month. Further, some of the earlier or later times given in the table may be exceptional and of such I cite a few instances in which I had noted the particular day. The song of the Blackbird is seldom heard here in February, and indeed only sparingly in early March. It was an

axiom with the late John Cottney that the Sedge-Warbler never sang in the vicinity of its nest, and the same has invariably been my own experience. The Chaffinch's song is usually first heard about the middle of February, and from then till the middle of July apparently every male bird in the neighbourhood sings all day long, but one heard singing on 4th November, 1915, is an exception. I have not heard the Chaffinch's song in this district prior to February,¹ but on 26th January, 1918, I noted one singing in Phoenix Park, Dublin. The song of the Corn-Bunting in November, 1911, must be exceptional; and I believe I have heard Skylarks singing in December though my note-books do not record the fact. The Landrail's "song" generally ceases to be uttered about the third week in July, but one was heard on the evening of 9th August, 1917. In 1908 I have a note of a Whitethroat perched on a telephone wire and rising therefrom in full song and descending to its perch several times as is its custom—this on 6th August.

PERIOD OF SINGING AS HEARD AT HILLSBOROUGH,
CO. DOWN, 1910-18.

Song-Thrush	..	..	Jan.-July; Sept.-Dec.
Blackbird	..	..	Feb.-July.
Redbreast	..	..	Jan.-Dec.
Whitethroat	..	..	May-July.
Golden-crested Wren	..	..	Jan.-July.
Chiffchaff	..	..	March-Sept.
Willow-Wren	..	..	April-Sept.
Sedge-Warbler	..	..	May-July.
Hedge-Sparrow	..	..	Jan.-Dec.
Great Titmouse	..	..	Jan.-Dec.
Coal-Titmouse	..	..	Jan.-Dec.
Blue Titmouse	..	..	Jan., March-May; Dec.
Wren	..	..	Jan.-Dec.
Meadow-Pipit	..	..	March-July.
Chaffinch	..	..	Feb.-July; Nov.
Corn-Bunting	..	..	March-Aug.; Nov.
Yellow Bunting	..	..	Feb.-Aug.
Reed-Bunting	..	..	Feb.; April-Aug.
Skylark	..	..	Jan.-July; Sept.-Nov.
Cuckoo	..	..	April-June.
Landrail	..	..	April-Aug.

¹ Since this was in type I heard two Chaffinches singing on 31st January at Hillsborough

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

DECEMBER 21.—The Vice-President (Rev. W. R. MEGAW, M.A.) gave a lecture on "The Popular Study of Mosses." Before calling upon the lecturer the Chairman drew the attention of the members to the fund that is being raised to defray the cost of publication of the "Supplement" to the Flora of North-East Ireland, a work that is being put out at the expense of the Club, and appealed for hearty support. Fifty pounds is needed, towards which eleven guineas has already been promised.

Mr. Megaw, in the course of his lecture, said mosses were found under every parallel of latitude, in the lowest swamps, and on the snow-line of the Alps. Some specimens grew with seeming indifference in any situation, others affect certain soils. Many mosses are to be found within our city boundaries, on walls and footpaths, and in our public parks and private gardens. Emphasis was laid upon the great importance of mosses in the general economy of nature, where they help to prepare the soil for plants of a higher order. The direct benefit they confer on man is limited, the supply of peat fuel being the chief. Quaint medical, domestic, and industrial uses of mosses were spoken of. Mosses, after lying by for decades, can be renewed by simply soaking them in water; thus life-like specimens may be examined long after the date of gathering. Peculiarities of growth, structure, and reproduction were dealt with. The lecturer discussed the value of moss exchange clubs, and made reference to the excellent work done in the study of mosses by a few of the older members of the Club. He ended by making an appeal to the younger generation on behalf of the study of bryology in North-East Ireland.

The lecture was illustrated by many specimens of mosses, and after its conclusion a short discussion took place, in which J. A. S. Stendal, Miss Rea, and the Hon. Secretary took part.

DUBLIN NATURALISTS' FIELD CLUB.

JANUARY 13.—The President, C. B. Moffat, in the chair. A. W. STELFOX delivered a lecture on "Snails and other things," which was illustrated by specimens of the different type of land and freshwater mollusca found in Ireland. After sketching the life histories of habits of several species of the various types, Mr. Stelfox surveyed the distribution in Ireland of the mollusca and touched lightly on the theories which have been put forward in this connexion, concluding with some evidence in favour of the supposition of a post-Glacial land connexion with Great Britain, which would have permitted the freshwater shells of the Severn basin to migrate to Ireland *via* a united Barrow, Nore, Suir, and Severn estuary.

A promising discussion was cut short by the approach of Curfew.

OBITUARY.

SYLVANUS WEAR.

The Belfast Naturalists' Field Club has to mourn the loss of one of its most faithful members in the person of Sylvanus Wear, who died after a very brief illness on 13th November last. Shortly after retiring from business and settling in Belfast in 1904, Mr. Wear became a member of this Club and for many years he acted as its librarian and an *ex-officio* member of its committee, besides undertaking many other duties in connexion with the Club. He was gifted with an ideal modesty as well as an endearing nature, and it follows that he was beloved by his intimate friends; so effectively did he efface himself that he was practically unknown outside this small circle. Readers of the *Irish Naturalist* will hardly be able to realise the activity with which he followed his love of natural history, as he could seldom be induced to record his finds. His interests were wide, but botany claimed him first, and it was in the Botanical Section of the Club that his activities were most felt. Some years ago when it became evident that a new Supplement to the "Flora of the North-East of Ireland" was becoming a necessity, Mr. Wear voluntarily undertook to collect and file all records of plants made since the former supplement was published in 1895. None of us will ever know how much time and love Mr. Wear spent upon this work, but it is with something akin to satisfaction that we can to-day record the fact that the MS. for the new Supplement was completed by Mr. Wear ten days before his death. This Supplement to the "Flora of the North-East" will shortly appear in print, and it is to be hoped that it will prove a fitting monument to his energy and ability.

Sylvanus was the second son of the late Thomas Wear of Felton Mills, and was born at Felton in Northumberland.

NOTES.

BOTANY.

An Irish Crane's-bill.

The report of the Botanical Exchange Club of the British Isles for 1919 (published 1920) contains a description of a new form of the Herb-Robert by Dr. C. H. Ostenfeld of Copenhagen, to which the attention of Irish botanists should be directed. His description reads as follows:—*G. Robertianum* L. nova sub-sp. *celticum* Ostenfeld. Quam typus gracilis et multo minus foetidum; caules non nisi ad nodos erubescentes, etiam in plantis in sole natis, petioli foliorum et pedunculi inflorescentiae quam in typo breviores; laminae foliorum superiorum quam petioli longiores. Habitat: Hibernia occid. in saxis calcareis ad Ballyvaughan. The plant

was collected on the International Phytogeographical Excursion of 1911, and has been grown and studied side by side with typical Irish and Scottish *G. Robertianum* by the describer. It is not known elsewhere at present than at Ballyvaughan.

ZOOLOGY.

Notes on Lepidoptera.

During my stay at Woodenbridge, Co. Wicklow, in June, 1919, I collected any lepidopteran larvae that came my way; but unfortunately most of them were stung by Ichneumons, and only a few changed into pupae; from these few I obtained in the spring of 1920, a fine *Notodonta chaonia*, which agrees with Kane's description of the Killarney and Clonbrock specimens mentioned in his "Catalogue of the Lepidoptera of Ireland," in its large size, white ground colour and strongly marked pattern. I also got 3 specimens of *Taeniocampa miniosa* var. *rubricosa*.

On the 6th August, 1919, I took here at Tempo the first *Argynnис aglaia* I had seen in this district; though a fine fresh specimen, I hardly think it could have been bred so far inland. I have seen no others since. During August and September, 1919, I was fortunate in finding eleven larvae of *Acronycta leporina*, feeding on low alder bushes, all these eventually burrowed into some rotten wood that I provided them with and produced eleven imagoes in April, 1920. I tried to breed from some of these moths in June, but only succeeded in getting one female to lay five eggs; these hatched out, but the little larvae refused to feed and died almost directly. On the 22nd of May, 1920, I saw a Painted Lady (*Vanessa cardui*), this is only the second one I have seen here, the other I netted in September, 1915.

CHARLES LANGHAM,

Tempo, Co. Fermanagh.

Sesia formicaeformis, a correction.

In my notes in the *Irish Naturalist* for December, 1920, I stated that this insect was new to the Irish list of lepidoptera; this is an error, as I quite overlooked the capture of two examples by Col. J. W. Yerbury at Glengarriff in June, 1901, and recorded by Prof. Carpenter in this magazine for January, 1902. My specimen is from the Kenmare district, where Mr. A. E. L. Sabine found the larvae not uncommonly in stems of sallows growing in exposed situations. No doubt it has a wide range in the South of Ireland.

THOMAS GREER.

Curglasson, Stewartstown.

Woodcock in Dublin.

On Saturday, December 18th, while watching a football match in Trinity College Park, and standing about twenty yards from the wall adjoining Brunswick Street, a bird which I at once recognised to be a Wood-

cock, flew over my head, having evidently been flushed by a boy who was climbing a tree close to the wall behind me. The bird flew over the ground, wheeled left-handed and was lost to sight in the fog over Brunswick Street. He was also seen by Surgeon Pringle who was standing further down the ground on my left. On examination, the bird had evidently been lying amongst some dead leaves which had collected under the wall. I reported this interesting occurrence to the *Irish Times* and a paragraph appeared in their paper on Monday, 20th. On that day I chanced to meet Mr. Croker Barrington in the street, who informed me that the last occasion on which a Woodcock had been seen in the Park was about fifty years ago. He was playing in a hockey match, when, as he described it, a bird zigzagged amongst the players, one of whom struck at it with his hockey-stick and killed it; on picking it up they found it was a Woodcock.

Kildare Street Club, Dublin.

HUGH D. PACK-BERESFORD.

Birds' Nests and their Fate.

A recent remark (*supra*, p. 5) by Mr. Burkitt that "In my experience, the odds are that when you have got as far as the nests, at least half of them and probably two-thirds will come to a bad end," put me in mind of some observations on this point made many years ago. For several years I searched for nests in the Holywood neighbourhood (Co. Down) with some industry, and kept notes of their history. The year 1884 supplies the most complete record, and I give below an abstract of it. About half of the nests were found within the confines of villadom; the remaining half in the plantations, glens, etc., of open undulating fertile country. The nests were more thickly distributed in the former section, but the percentage of casualties was higher there. The species of birds represented, and the number of nests in each case, were as follows: Blackbird, 65; Chaffinch, 41; Goldcrest, 2; Great Tit, 1; Greenfinch, 30; Grey Wagtail, 1; Hedge-Sparrow, 20; Jackdaw, 3; Kestrel, 1; Lesser Redpoll, 2; Linnet, 2; Magpie, 20; Meadow Pipit, 1; Missel-Thrush, 5; Robin, 17; Skylark, 1; Song-Thrush, 19; Sparrow, 2; Sparrow-Hawk, 2; Spotted Flycatcher, 1; Starling, 3; Water-Ouzel, 2; Waterhen, 3; Woodcock, 1; Wood-Pigeon, 11; Wren, 14; Yellow-hammer, 12. Total of all species, 282. If U stand for "nest left unfinished"; D, "nest deserted with eggs or young"; R, "nest robbed or eggs or young destroyed"; F, "young safely fledged"; and O, "end not known," the story of the 282 nests, expressed in percentages, was

$$U=8, D=15, R=35, F=35, O=7.$$

Or dividing the uncertain 7 per cent. proportionately, we may say 37 per cent. of the nests saw broods safely fledged, 63 per cent. of them were built in vain. These figures show the correctness of Mr. Burkitt's inferences. Of those birds of which a good number of nests were observed, the most successful species were—Robin (48 per cent. fledged), Yellowhammer (42 per cent.), Chaffinch (41 per cent.), Magpie (40 per cent.)

The species which most frequently suffered disaster was the Song-Thrush (only 11 per cent. of the nests saw fledged young) ; while the next in misfortune were Hedge-Sparrow (22 per cent.), and Blackbird, Greenfinch, and Wren (each 32 per cent.). In the case of the last, however, four nests left unfinished were presumably cock nests.

R. LLOYD PRAEGER.

Dublin.

British Long-tailed Tits in Belfast.

The winter of 1916-17 so carefully recorded by Mr. C. B. Moffat in the *Irish Naturalist* for June, 1917, page 89, was probably the hardest on our avifauna in the memory of the present generation, and amongst others he draws attention to the extermination of the Long-tailed Titmouse (*Ægithalus caudatus roseus*) in his district ; the same thing seems to have happened here for I have no note of this species in our trees since that winter till yesterday, Christmas Day, 25th December, 1920, when I saw a flock of about a dozen hunting for insects on the Sycamore and Birch trees. I hope they have recovered their old status and that they will become plentiful again.

W. H. WORKMAN.

Lismore,

Windsor Avenue, Belfast.

The Wren.

I am glad that several contributors have queried one item in my notes about this bird, namely, that some males do not appear to feed the young in the nest, and I hasten to admit that such males are probably exceptional. I have seen other males feeding. But this was a minor point. I still suggest that most females have the nest built for them. However in a multitude of observations there will be wisdom.

Enniskillen.

J. P. BURKITT.

Bats in Co. Fermanagh.

For many years I have been trying to find a "roosting" place of Dauben'on's Bat (*Myotis Daubentonii*), which is a common species here, but until August, 1919, I never could locate it ; however, I then found a large colony of about forty females and two males, under the eaves of my motor house. We had to smoke them out, and caught them as they emerged through a small hole in the wall, with a butterfly net. Among them was one male Pipistrelle (*Pipistrellus pipistrellus*). On the other side of the gable, we smoked out a quantity of Pepistrelles, but there were no Daubentons amongst them.

On August 3rd, 1919, I picked up dead in the yard an immature reddish-gray Bat (*Myotis Nattereri*), and a few days later had an adult male of the same species brought to me alive, it had been captured in a room of a house in the village of Tempo. So far I have taken in this immediate

neighbourhood five species of Bat, viz.: *Pterygistes Leisleri*, the Hairy-armed Bat; *Pipistrellus p. pipistrellus*, the Pipistrelle; *Myotis Daubentonii*, Daubenton's Bat; *Myotis Nattereri*, the Reddish-gray Bat; and *Plecotus auritus*, the Long-eared Bat. Many years ago I recorded the Whiskered Bat from here, but I am now doubtful as to its having been correctly identified.

CHARLES LANGHAM.

Tempo, Co. Fermanagh.

REVIEW.

THE SOARING OF BIRDS.

Soaring Flight : a Simple Mechanical Solution of the Problem. By LT.-COL. R. DE VILLAMIL (late R.E.), author of "A B C of Hydrodynamics," &c. London: Charles Spon. 1s. 6d. net.

In a modest little pamphlet consisting of only 48 pages Lieut.-Colonel de Villamil has put forward what appears to be a perfectly triumphant solution of the question—How are some of the larger birds enabled to rise in spiral ascents to a great height in the air with no visible effort on their own part, and certainly without the exertion of once flapping their wings? The simplicity of the explanation offered—when one looks back on the amount of controversy that has been expended over the question—is little short of startling.

To all students of the flight of birds this subject of "soaring flight" has hitherto proved a complete stumbling-block. The ancient Hebrew sage who spoke of "the way of an eagle in the air" as first of the four things that were too hard for his understanding would seem to have had quite as good a grasp of the nature of the problem as most of the biologists who have written of it in recent years. Professor Charles Roy (in the article on "Flight" written for Newton's "Dictionary of Birds") was able to dismiss pretty summarily nearly all the theories put forward on the subject by stating that they fell naturally into two great categories—those that ignored the laws of dynamics and those that were based on inexact knowledge of the observable facts. Two—and only two—of the then existent hypotheses were partially—and only partially—exempted by Professor Roy from this sweeping condemnation. These were the theory of upward currents of air, and that of varying velocity of the wind at different heights. To the first of these there is the obvious objection that it postulates for the ascending currents a height, a strength, a command of space, and a numerical abundance that we have no reason to believe them to possess in any part of the world. To the alternative theory (though Professor Roy gave it a hesitating preference) there is

the obstacle that it also presupposes conditions in the atmosphere widely different from what we have reason to believe to prevail—at least in the higher regions—while it is far from clear that the feat of soaring would be adequately explained by the most elaborate stratification of swifter and slower currents. It is worth noting that in the late Mr. F. W. Headley's important work, "The Flight of Birds" (published in 1912) the opinion is once more decidedly maintained that soaring can only be effected in ascending currents. Mr. Headley frankly confesses that the "varying velocities" theory is unintelligible to him, and he gives the full weight of his authority to the time-honoured view that soaring in a horizontal and uniform wind would be impossible.

It is the uniformly acknowledged impossibility that Colonel de Villamil puts forward as the only intelligible and perfectly simple solution of the whole riddle. In his view, the time-honoured and hitherto unchallenged opinion that no bird could soar in a horizontal and uniform wind is based on sheer forgetfulness of the principle of the conservation of energy. The soaring bird rises with an energy that it has "trapped" from the wind before commencing its spiral ascent, and continues to "trap" afresh during each down-wind half of the circles it describes in the whole course of the spiral movement.

Those who wish to follow Colonel de Villamil's quantitative estimates of the various steps in a soaring bird's progress should consult his pamphlet; but his general conception can be made clear without them. Supposing a horizontal wind with sufficient force acting or "doing work upon" a bird that is flying with the ordinary "rowing" action a more or less down-wind course, he shows that the bird will soon have acquired a velocity and a kinetic energy much in excess of what it would have possessed but for the work of the wind. Converting some of this superfluous kinetic energy into potential energy of height, it ceases to flap, adjusts its wings at an appropriate angle, and rises for the first half (the upwind half) of the first round of its spiral. The second or down-wind half of the round is a mere gliding descent, in which the wind again works on the bird and returns to it the energy it had expended during the up-wind curve. There is, therefore, nothing to prevent the spiral from being continued *ad infinitum*, provided the wind remains uniform. As observers are agreed that in actual soaring the rise is limited to the up-wind half of each round. Colonel de Villamil's explanation certainly seems to stand the test of meeting the known facts of the case with an exactness that seems almost above criticism. It will give an added interest to the fine spectacle of a Heron or a Gull "screwing up" into the air to endeavour to compare its movements with those required by this "simple mechanical solution"—though the full weight of Colonel de Villamil's reasoning can only be appreciated by those having some acquaintance with the more powerful soarers—the Vultures, Albatrosses, Adjutant Birds, etc.—that can be watched in more southern regions. That the author has hit on the real clue to a very ancient puzzle will scarcely be denied.

C. B. MOFFAT.

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March, 1921.

The Irish Naturalist.

29

TURTLES ON THE IRISH COAST.

BY R. F. SCHARFF, B.Sc., Ph.D.

MISS M. J. DELAP, of Valentia Island, who is a well-known and valuable correspondent of the *Irish Naturalist*, sent a dead turtle to the Museum on the 27th January last. In the letter accompanying this rare and interesting specimen she alluded to the fact that there had been a tremendous drift lately of Velella and other floating organisms. During the great storms of the 17th and 18th of January and for several days after the shores of Valentia Island were strewn with living Velella in every stage of development from one to seventy millimetres in length. Miss Delap also succeeded in hatching the eggs of Velella (which is a floating hydrozoan) and she reported the larvae to be "gaily swimming about in my sea-water tank." She also found one Ianthina (a floating mollusc with a purple shell) and parts of two Spirulas (cuttles with coiled shells). No doubt, as Miss Delap suggests, the turtle has been conveyed to the Irish coast by the same storms.

The turtle reached the Museum a couple of days later, and it was quite evident from its condition that it had only died recently. There were no marks on the body to show that it had been dashed against the rocks; nevertheless that was probably the cause of death. It presented no signs of decay and the under surface of the body was covered with a growth of some hydroid which could not be named, as the turtle had been greatly knocked about during the transit from Kerry to Dublin.

Inclusive of the head, the turtle measured $13\frac{1}{4}$ inches and weighed 4 lbs. 7 ozs. The shell, which almost covers the body, was $9\frac{3}{4}$ inches long and 9 inches wide. The strong keels in the middle of the upper surface of the shell, the serrated posterior margin, the number of marginal plates, the large head with its powerful hooked jaws, and the fact that the flippers had two claws, all confirmed the view that we had to deal with a young specimen of the Loggerhead Turtle (*Thalassochelys caretta*). Its flesh is not palatable like that of the Edible Turtle and the tortoise-shell is of no commercial value. The species grows to

a length of six feet and has a wide range. Besides all the tropical seas, it inhabits the Mediterranean and is an accidental visitor to the western coasts of Europe.

The Irish turtle, if we may call it so, above referred to, must have drifted to our shores either by means of the Gulf Stream from the West Indies or with a marine current from the Mediterranean. The fact that it was accompanied by *Velella*, *Ianthina* and *Spirula*, which are tropical forms of life, proves that they all were carried to our shores by the Gulf Stream. It might be contended since *Ianthina* and *Velella* are frequently met with in the Mediterranean, that they and the turtle were transported to Ireland by the Rennel current or other marine current coming from the coast of Portugal. *Spirula*, however, is not to my knowledge found in the Mediterranean nor is *Physalia*, which occasionally finds its way to the western shores of Europe. Miss Delap reported to me that she had heard of a *Physalia* being seen in Bantry Bay recently. And this remarkable creature, belonging to the jelly-fish tribe and perhaps better known by the popular name of "Portuguese Man-of-War," is surely a native of the tropical seas and not found in the Mediterranean.

In a letter addressed to the *Field* and published in the issue of the 5th February last, Mr. P. J. Dennehy states that a turtle was picked up dead but quite fresh in Pulleen Harbour at the mouth of Bantry Bay during the previous week. It weighed $3\frac{1}{2}$ lbs., had a ridge with 5 tubercles, and measured 13 inches in length and 9 inches across the back. It was therefore slightly smaller than the Valentia turtle, also a Loggerhead, and no doubt was cast ashore during the storms referred to by Miss Delap.

Such occurrences may be thought to be quite unique, but in 1890 a young Loggerhead Turtle, measuring $8\frac{1}{4}$ inches in length (10 $\frac{1}{2}$ including the head), was washed ashore in Donegal Bay. It has been exhibited in the Dublin Museum ever since. Several records of similar occurrences are known from the west coast of Scotland and the south-west of England, while an adult Loggerhead Turtle was stranded in 1894 on the coast of Belgium.

NOTE ON CAREX MURICATA L. AND ITS
SEGREGATES C. CONTIGUA HOPPE
AND C. PAIRAEI SCHULTZ.

BY A. W. STELFOX.

Carex muricata of Linné appears nowadays to be generally regarded as a composite species, and in England it is the custom to refer plants to one or other of its segregates *contigua* or *Pairaei*. So far as I know, the only Irish references to either of these species are by R. Ll. Praeger (in "Flora of the West of Ireland") and R. W. Scully (in "Flora of Kerry"), where all "*muricata*" records are referred to *contigua*, and it seems to have been inferred that *Pairaei* is absent from Ireland. My attention was first drawn to the latter by an English correspondent—Mr. Norman G. Hadden—about a couple of years ago. At that time the form of "*muricata*" recorded from the Belfast district (Co. Antrim) was the only one known to me, and this Hadden named typical *contigua*, at the same time sending me a specimen of *Pairaei* for comparison, together with notes on its habits and characters in which it differed from *contigua*. During last August I searched for and found Dr. Scully's station for "*muricata*" near Sandyford, Co. Dublin (see *Irish Nat.*, xxviii., 90, 1919), and was at once struck by the resemblance of this plant to Hadden's specimen of *Pairaei*. Several authorities have since verified specimens from this locality as undoubtedly *Pairaei*, including Messrs. Arthur Bennett, C. E. Salmon and H. Stewart Thompson, so that it is now possible definitely to add *Pairaei* to the list of Irish sedges.

C. Pairaei is stated to prefer dry, sandy situations, just such as that near Sandyford, where it grows on a dry bank built of granite boulders and sods of sandy earth. *C. contigua*, on the other hand, is more often found in damper, richer ground, but the two species have been reported to grow in association in England; and I can assert that *contigua* has not lost any of its characters through being grown in a dry spot in my garden.

The chief differences between the two species are as follows :—

C. CONTIGUA.

Taller, more robust, with stouter, greener stem.

Fruit also greener and more like that of *divulsa*.

Fruit long and tapering gradually into a long beak.

Ligule much larger.

C. PAIRAEI.

More slender, with darker, more wiry stem.

Fruit brown and more like that of *teretiuscula*.

Fruit shorter and contracting much more suddenly into a short beak.

Ligule shorter and smaller.

In both species the spikelets are contiguous, but there is a tendency for the lowermost spikelet to be separated from those above, as in many other sedges.

On the sun-baked western side of the ditch at Sandyford the fruiting stems of *Pairaei* were only some 4 to 6 inches long, but on the eastern, more shaded side they attained nearly 2 feet, or, in other words, were nearly as long as those of *contigua* grown in my garden. The figure of "*muricata*" given in "Bentham and Hooker" appears to delineate *Pairaei*, although the enlarged sketch of the fruit agrees with my *contigua*. In *Pairaei* the fruiting spike is usually (but not always) subtended by a short bract, as shown in the figure just mentioned. The plant of *contigua* in my garden has never a bract beneath the spike.

The exact locality for *Pairaei* at Sandyford is on the eastern side of the old road, half a mile south of that place, just south of where this road crosses that from St. Columba's to Leopardstown, and on the summit of a slight eminence. It is not clear whether this is Dr. Moore's station given in *Cybele Hibernica*, viz., "Near Stepaside, on the way to Holly Park" (now St. Columba's College).

To judge by specimens in the National Herbarium, *Pairaei* is quite as common, if not more prevalent, in central and southern Ireland than *contigua*, but fresh material is necessary before the distribution of the two species can be worked out. For assistance in compiling this note my thanks are due to those mentioned above, as well as to Miss M. C. Knowles.

SOME IRISH HYMENOPTERA ACULEATA.

BY REV. W. F. JOHNSON, M.A., F.E.S., M.R.I.A.

LIKE other insects, the Aculeate Hymenoptera (Ants, Bees and Wasps) suffered from the wet season, and I am consequently only able to present comparatively few species ; but lack of quantity is redeemed by the quality of some of my captures, as will be noted below.

Pompilus gibbus is a very active insect, running and flying among herbage so quickly as to make its capture difficult, for it keeps so low that the net is very apt to be diverted by hitting the sand or some tuft of grass. I met with several on the sandhills at Portnoo, and have taken it at Newcastle, Co. Down ;¹ it has also been taken in several localities in the South of Ireland. It frequents sandhills, into which it burrows to make a nest for its larvae. It is said to provision its nests with spiders, stung into a state of paralysis, as so well described by J. H. Fabre in "Hunting Wasps" ; but this I was unable to observe.

Passaloecus monilicornis is distinguished from others of its genus, in the male, by the form of its antennae, which are somewhat dilated in the middle, with the joints bead-shaped, giving it a very distinct appearance. I took it in what I call "lane," which is really my back avenue, where there is a plentiful supply of bramble stems and old wood, in which it is said to make its burrows. I may remark that I have examined a good many dead bramble stems without meeting with the nests of this or any other species, but this is probably my misfortune and not the fault of the Fossors. I have, however, found a piece of dead wood with burrows of something in it, and I am waiting patiently till the spring to see if anything will emerge.

Crabro clavipes is a pretty little insect noticeable for its very long "waist," which is really the first segment of its hind body. I took one in a window and another in one of my fields on a very hot day at the end of August. As it is

¹ *Irish Naturalist*, 1907, p. 244.

only about $\frac{1}{5}$ inch in length and very slender, it is easily overlooked. It is said to nest in bramble stems.

Crabro palmipes was very common on the sandhills at Portnoo, and seemed to be particularly attracted by Knotted Figwort (*Scrophularia nodosa*), of which there was a large patch growing in a sheltered hollow, close to a bank of sand in which the Fosser was making its burrows. It was running over the leaves and flying about the plants in numbers, and I was able to take as many as I wanted.

I found *Crabro leucostomus* at a rose-arch made of pine logs at Lenaderg House, and my friend Mr. C. M. Davies sent me *C. cavifrons* and *C. varius* from the same place. All were making their burrows in the dead wood. Mr. Davies also captured *Chrysis ignita*, which he found entering the holes in the rose-arch. *Chrysis* is not an aculeate, but is parasitic on various aculeates, e.g., *Odynerus*, entering their nests and laying its eggs therein. The females have an ovipositor, which can be withdrawn or protruded at will, but, as far as I know, no sting. The popular name for them is Ruby-tailed Flies.

Oxybelus uniglumis was in considerable numbers at the same bank of sand at Portnoo that *Crabro palmipes* frequented, and I watched it carrying its prey to its burrow, a matter of some difficulty, as the fly was sometimes as big as its captor. When a gust of wind came both captor and captive were blown about mercilessly, but *Oxybelus* held on, even when dashed on to the sand, and ultimately reached its burrow. I obtained specimens of the flies it was carrying, and Mr. J. E. Collin, F.E.S., has kindly identified them as *Mydaea duplaris* and *Hylomyia coarctata*.

If I had met with nothing else but *Colletes montanus* at Portnoo, it would have been sufficient reward for my visit, at the same time I must acknowledge that it was more by good luck than good guidance that I obtained them. I took two males on the sandhills, but I was quite unaware of my good fortune until Mr. R. C. L. Perkins, D.Sc., F.R.S., to whom I had sent them with other Aculeata, informed me what they were. This species was introduced to the British List by the late Mr. E. Saunders, F.R.S., on specimens taken

by Mr. A. A. Dagleish on Irvine Moor, near Glasgow.¹ In Ireland it has been taken by Col. Yerbury at Waterville, Co. Kerry.² I do not know of any other records of its capture.

Sphecodes ferruginatus and *S. hyalinatus* have, as far as I know, only been taken in Ireland, the former at Clare Island, and the latter at Castlebar.³ *Sphecodes* are small black and red insects, and are said to be parasitic on *Halictus* in the same way as *Nomada* is on *Andrena*. They certainly are associated with *Halictus*, for where the one is found so is the other. Doubt has been thrown upon the supposition that they are parasitic, because *Sphecodes* has been seen to make a burrow for itself; but however that may be, the habits of the two genera are similar, and Mr. R. C. L. Perkins, who has given much attention to the matter, is convinced that *Sphecodes* is an inquiline of *Halictus*.

The species of *Halictus* and *Andrena* make their nests in the ground, but each one makes a burrow for itself, for they are solitary workers; and though a number may be found together in one place, still each works for itself and resents the intrusion of a neighbour. I find them here in dry banks, and even on the side of the road, in fact I have nearly walked on *Andrena cineraria*. At Portnoo I found them making their burrows in a pathway along the sea-shore, which one would have easily supposed to be too hard for the little excavators to make any impression; they also had many burrows in the sandhills. Where the locality is suitable and space available, large numbers congregate, but this is only an assemblage, and there is no co-operation or partnership, as in the case of Hive Bees or Social Wasps. They are very fond of the flowering catkins of Sallows and Willows, and when there is an early blossoming of these they are among the earliest visitors. At Armagh I used to take *Andrena clarkella* among the first bees; as soon as the catkins flowered it was sure to be there. Here I have no catkins near me, and I generally see *A. cineraria* first, in fact I have not met with *A. clarkella* here at all.

In the end of June last I captured a male *Megachile*, which I was unable to determine satisfactorily. I have

¹ *Ent. Mo. Mag.* 1899, p. 262.

² *Ent. Mo. Mag.*, 1902, p. 53.

³ *Proc. R.I.A.*, 1911, Vol. xxxi., part 24.

submitted it to Dr. Perkins, and he very kindly informs me that it is *Megachile versicolor* Smith, a close ally of *M. centuncularis* L. These are the Leaf-cutter bees, so called from their habit of cutting pieces out of leaves wherewith to line their nests.

The species of *Nomada* are, as I have already remarked, parasitic on *Andrena*. They are conspicuous insects in yellow and black, or yellow and brown, quite unlike their hosts, in fact, most people would call them wasps. I have been fortunate in taking a good many species here, but, so far, have failed to assign them to their proper hosts. To accomplish this requires a good deal of time and patience, and, above all, good weather, for the bees are not active except in sunshine.

PSAMMOCHARIDAE (Pompilidae).

Psammochares (Pompilus) nigerimus Scop.—Portnoo, June.

P. gibbus Fab.—Portnoo, both sexes, on sandhills, June; July.

SPHEGIDAE.

Passaloeus monilicornis Dhlb.—Poyntzpass, lane, July.

Crabro clavipes L.—Poyntzpass, in window and field, August.

C. leucostomus L.—Lenaderg, at rose arch, June.

C. palmipes L.—Portnoo, both sexes plentiful on sandhills, June, July.

C. varius Lep.

C. cavitrons Thoms. } Lenaderg, at rose arch, July.

C. chrysostomus Mor.—Poyntzpass, field at Hogweed, females, August.

C. lituratus Panz.—Poyntzpass, field, July.

Oxybelus uniglumis L.—Portnoo, sandhills, both sexes, June, July.

COLLETIDAE.

Colletes montanus Mor.—Portnoo, sandhills, males, July.

ANDRENIDAE.

Sphecodes subquadratus Smith.—Lenaderg, a female, June.

S. ferruginatus Schrank } Portnoo, shore, June.
S. hyalinatus Schrank }

S. affinis v. Hag.—Poyntzpass, roadside, June.

Halietus rubieundus Chr.—Portnoo, sandhills and shore, June, July.

H. cylindricus Fab.—Poyntzpass, field, September.

H. nitidiuseulus K.—Poyntzpass, roadside, June.

Andrena trimmerana Auct., var. **scotica** Perkins.—Armagh, Poyntzpass, Tempo, April, May, June. This var. has the face beneath the antennae with black hairs.¹

¹ R. C. L. Perkins, "British Species of *Andrena* and *Nomada*," *Trans. Ent. Soc.*, 1919, p. 218 sqq.

Andrena fucata Smith.—Poyntzpass, both sexes, June, July; Carlingford, May.

A. nigroaenea K.—Poyntzpass, in garden on laurel hedge; Carlingford, on roadside, May.

A. gwynana K.—Portnoo, shore, June.

A. sericea Chr.—Portnoo, sandhills, June.

A. coitana K.—Poyntzpass.

A. wilkella K.—Portnoo, shore, June.

Nomada armata H.S.

N. goodeniana K. (*succincta* Panz.) } Poyntzpass, field, May.

N. marshamella K. (*alternata* K.) }

N. ruficornis L.—Poyntzpass, field, May; garden, June.

N. fabriciana L.—Poyntzpass, roadside, May.

N. flavoguttata K.—Poyntzpass, field, May; garden, June.

APIDAE.

Megachile versicolor Smith.—Portnoo, shore, June; Poyntzpass, August.
Poyntzpass.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 12.—The Club met at Leinster House. DR. G. H. PETHYBRIDGE exhibited sections of the needles of *Pinus excelsa*, from a nursery in Wexford, attacked by the parasitic fungus *Lophodermium lineatum*. The attack was noticed in 1919, and the fungus causing it was described as a new species by Miss A. Lorrain Smith and Mr. J. Ramsbottom (to whom specimens for identification had been forwarded by the exhibitor) in *Trans. British Mycological Soc.*, vi., 4, p. 365, 1920.

SIR F. W. MOORE exhibited *Chrysomyxa abietis* in its winter stage. At former meeting exhibitor had shown specimens in the summer stage. The latter came from Co. Wicklow, the specimens now shown were obtained in Co. Dublin. It has also been found in Co. Meath.

H. A. LAFFERTY exhibited preparations illustrating the effect of the "browning" fungus on flax fibres. The middle lamella of the cells was converted into a substance which, when tested microchemically, gave the characteristic reactions of lignin.

FEBRUARY 9.—The Club met at Leinster House. PAUL A. MURPHY exhibited a preparation of portion of the leaf of a potato plant affected with leaf roll, and a corresponding portion of a healthy plant. The cause of the leaf roll is unknown, but the disease brings about a marked retardation in the rate at which starch is removed from the leaves. The most outstanding difference, therefore, between diseased and healthy leaves is the presence of abundant starch in the morning hours in the former, and its practical absence in the latter.

J. N. HALBERT exhibited a beetle, *Trigonogenus globulus*, Solier, found recently amongst clover seeds imported into this country. The insect belongs to the family Ptinidae, which contains many species liable, on account of their habits, to dispersal through commerce and of almost cosmopolitan range. The present species is a good example, having been recorded from countries as far apart as Tasmania, America and Great Britain.

Dr. G. H. PETHYBRIDGE exhibited germinating seeds and seedlings of *Cyclamen neapolitanum*. Seed had been produced by plants brought from the Alban Hills, near Rome, early in 1914, and grown since then in Dublin. On germinating the hypocotyl develops at once into a small round tuber or corm. Roots develop from the bottom of the corm, while a single cotyledon, apparently, is found on top. The distal end of this remains within the seed for a time, functioning as a food-absorbing organ. Later it appears above ground and develops a green lamina. Near the point of attachment of the petiole of the cotyledon to the corm a small structure or rudiment is present, the exact nature of which has only recently been made clear (see A. W. Hill, *Annals of Botany*, xxxiv., no. 136, Oct., 1920, p. 417). This rudiment is, in fact, a potential second cotyledon. For, if the first cotyledon be removed partially or wholly, or if its lamina fails to escape from the seed coat, as sometimes happens, the rudiment develops into a second cotyledon. Thus the aberrant type of seedling in *Cyclamen* is not monocotyledonous, as some of the older observers maintained, but truly dicotyledonous.

BELFAST NATURALISTS' FIELD CLUB.

JAN. 18.—The President (S. A. BENNETT) referred to the recent loss the Club had sustained in the deaths of Canon H. W. Lett, one of the great authorities on Irish mosses, and a member of forty-four years' standing; Mr. Pim, a well-known entomologist and a member for fifty-two years; and Mr. Hamilton, also a member of long standing. The President also referred to the subscription that is being raised to defray the cost of printing the new "Supplement to the Flora of the N.E. of Ireland," a work which will rank high in the local scientific literature.

Professor GREGG WILSON lectured on "Frogs and their Relatives." After describing the haunts and habits of the Common Frog, he gave a brief account of the characteristics of the Edible Frog, the toads, the newts and salamanders, and the caecilians. The amphibia have not only invaded the surface of the earth, but some, such as the caecilians, burrow into it; others, such as Proteus, live in dark underground caverns; many frogs have taken to arboreal life, and one at least has developed a certain power of flight. Drinking in the ordinary way is not a practice of the amphibia, water being absorbed through the skin. In some cases the male carries the eggs about for a time, and only puts them into the water when they are nearly ready to hatch. But the most striking of all modifications is when the eggs are retained in the oviducts, and the larva not only develops there

but passes through its whole metamorphosis, being fed on material derived from neighbouring eggs that have broken down. The lecture was illustrated by a fine series of excellent lantern views.

T. Edens Osborne and W. M. Crawford were elected members of the Club.

FEB. 1.—The Hon. Secretary (A. McI. CLELAND) read a paper entitled "The Pastor's Account Book: 1768-1780," in which he gave an account of the ministrations of the Rev. Joshua Symonds, minister in the Old Meeting House, Bedford.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 11.—The Vice-President (C. B. MOFFAT) in the Chair. There was a large attendance. Miss M. G. FLOOD opened an extremely interesting discussion with a short paper on "The Fauna and Flora of a Rock-Pool," describing in popular terms the properties of many of the more interesting sea-weeds (of which a series of beautifully mounted specimens were exhibited on the table), after which she dealt in similar fashion with the various animal inhabitants, and the complicated cosmos of which they form the chief material. Discussion on Miss Flood's paper was carried on by W. F. GUNN, R. LI. PRAEGER, E. TENISON COLLINS, ALEX. WILLIAMS, MISS WEST, and PROFESSOR HENRY, and little time was left for the carrying out of a further programme of exhibits, including an interesting SAXIFRAGE shown by R. LI. PRAEGER. A new member (Athole Harrison) was elected.

DECEMBER 9.—The Vice-President in the Chair. Discussion was opened by Miss SHEILA SAUNDERSON with a paper on "Some Garden Pests" which covered a wide field, dealing with slugs and snails, Oniscidae, and the various insect-pests that gardeners have to deal with, and prescribing treatment to meet the several emergencies. Discussion was carried on by Messrs. E. TENISON COLLINS, W. F. GUNN, and A. HENRY, the subject of Fungi being imported by one of the speakers as an additional pest to those mentioned by the lecturer.

FEBRUARY 10.—The President in the chair. ATHOLE HARRISON read a paper on "Bird's Eggs." The paper dealt with the variations in number, shape, size and colour which exist in birds' eggs. Birds such as the Titmice and Goldcrest, which are not well able to survive severe weather, as was shown in the winter of 1916-17, lay large clutches of eggs, up to ten or even more. All eggs were probably originally white, and the presence of colour is due to the need for a reduction in the visibility of the egg, the most extreme form being known as "protective coloration." Some eggs, not usually so regarded, come under this heading, although the colour is not protective the colouration is. An example is the egg of the Missel Thrush and, when a nest of this bird containing eggs is viewed from above, it often appears to contain only dead leaves.

NOTES.

ZOOLOGY.

Drift on the Kerry Coast.

Following a long period of heavy seas and broken weather, the gale on the 17th January brought a large drift of *Veabella spirans* into Valentia Harbour. They were left on the shore in great numbers, a deep band of vivid blue. Considering the very rough seas through which they had come, they were very little damaged, most of them alive, in every stage from tiny specks to almost 3 inches in length (1 to 70 mm.). One broken Ianthina and parts of two Spirula were also found, and the usual accompaniment of barnacles attached to cork, cinders, etc.

On the 27th January a small Turtle was found stranded on the same beach, dead, but not long so. Dr. Scharff pronounces it a young Logger-head¹; it is now in the National Museum.

In the *Cork Examiner* of 3rd February, a correspondent reports the arrival in Bantry Bay of a large fleet of Portuguese Men-o'war, greatly to the amazement of sailors, who were accustomed to see them in warm southern seas and not in these colder waters.

Valentia Island.

M. J. DELAP.

Recent Records of Irish Birds.

An adult male Avocet (*Recurvirostra avosetta*) and an immature male Glossy Ibis (*Plegadis f. falcinellus*) are recorded by Mr. C. J. Carroll (*British Birds*, 1921, p. 188) as having been shot in Co. Wexford in the autumn of 1917. A female Goosander (*Mergus m. merganser*) observed by G. R. Humphreys on Kylemore Middle Lake in December, 1919 (*ib.*, 1920, p. 275), is apparently the first known occurrence of this species in Connemara; and a Carolina Crake (*Porzana carolina*) reported by Mr. Clifford D. Borrer (*ib.*, 298) as taken on board H.M.S. Dragon, about 100 miles off the west coast of Ireland early in 1920, is of interest in connection with the occurrence of a bird of the same species at Slyne Head lighthouse on April 11th, recorded by Prof. Patten in this Journal (vol. xxix., p. 59). Mr. R. F. Rutledge, in a series of notes from various parts of Ireland (*British Birds*, 1920, p. 142), mentions the extension of the range of the Stock-Dove (*Columba oenas*) to Co. Galway; and the breeding of the Manx Shearwater (*Puffinus p. puffinus*), on Inishbofin is reported by Mr. H. B. Cott (*ib.*, 1921, p. 188).

¹ See Dr. Scharff's article, p. 29 of this number.

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" 26.	Winter Fattening of Cattle.	" 78.	Home Buttermaking.
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" 29.	Flax Seed	" 81.	Potato Culture on Small Farms
" 30.	Poultry Parasites—Fleas, Mites, and Lice.	" 82.	Cultivation of Main Crop Potatoes
" 31.	Winter Egg Production.	" 83.	Cultivation of Osiers.
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Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters application so addressed need not be stamped. Envelopes should be marked "Publications."

HENRY WILLIAM LETT.

HENRY WILLIAM LETT was born at Hillsborough, in Co. Down, on 4th December, 1836, and died at Aghaderg, in the same county, on 26th December, 1920, at the age of 84. The son of a clergyman of the Church of Ireland, he in turn was ordained, and spent his life as a country rector within thirty miles of his birthplace—first at Derriaghy, in Antrim, subsequently at Meigh and Ardmore in Armagh, but mainly at Aghaderg, in Down.

Like his contemporary S. A. Stewart, H. W. Lett does not appear to have taken to natural history pursuits till long after attaining manhood. He joined the Belfast Field Club in 1878, fifteen years after its foundation, when he was forty-two years of age. His first published contribution is a brief report of a paper read before the same Club on 15th November, 1881 (when he was forty-five), entitled "Records of a Former Level of Lough Neagh," and describing the remarkable submerged scarp—still unmapped and unexplained (see *I. N.*, xxiv., pp. 8, 65)—that extends along much to the southern and western shores of the lake. His first botanical contribution was a paper read before the Club a year and a half later, on "Fungi, Mushrooms, and Toadstools—Disease, Blight, and Food-producing Plants." To the Fungi he paid considerable attention for many years, acting as conductor of various "Fungus Forays" organised by the Club, and publishing in 1885, as a Supplement to the Club's Proceedings, a list of the local species to the number of 581. Lett paid some little attention also to Lichens, and indeed there was no group of plants which he did not explore.

To the Mosses and Hepaticas he devoted much time, and his published work deals mainly with these groups. To the Proceedings of the Royal Irish Academy (of which he was elected a member in 1896) he contributed three Reports on these plants. The first (1889) dealt with the flora of the Mourne Mountain district; the second (in conjunction with D. McArdle) on the plants of Torc Waterfall, near Killarney, famous among bryologists; and the third formed one of the Clare Island Survey series. The field-work for the last-named was carried out when Lett was

approaching 75 years of age, and those who had the pleasure of working with him on those western trips will recall his pleasant companionship, his energy, and his indifference to weather and hardship in that wild tangle of sea and land. He loved the open country, and visited many parts of Ireland—Donegal, Sligo, Connemara and West Mayo, the Galtees and Comeraghs, and the mountainous parts of Kerry, mostly in search of mosses. The present writer was with him on the last of his more extended trips when, at the age of seventy-seven, he accepted R. J. Ussher's invitation to join in a week's work on the Saltees, where we lived in a ruined house (the only one on the island), sleeping on straw on the floor in that portion which still retained a roof. The most interesting plant which resulted from his work among the Irish Cryptogams was *Adelanthus dugortiensis*, a new Hepatic, whose nearest relation (*A. unciformis*) is an inhabitant of the southern end of Africa and South America. He published in 1902 a "List with Descriptive Notes" of British Hepatics, which was founded on Pearson's well-known work, and brought the list of species up to date ; and two years later issued a "Catalogue of British Hepatics." in which some errors in the former work were set right. He was an original member of the Moss Exchange Club, in which he took a warm interest. His final publication on Irish cryptogams was the important "Census Report on the Mosses of Ireland," published by the Royal Irish Academy in 1915.

The Flowering Plants were also well known to him. His herbarium shows that many were collected and named before he left Ardmore, on Lough Neagh, in 1886. Though the Rubi were the only group to which he devoted more than cursory attention, his excellent eye detected some plants overlooked by his predecessors and contemporaries—for instance, the interesting northern *Carex pauciflora*, which, though now known to be abundant over the Garron Plateau, in Antrim (see *I. N.*, xxix., 27), remained undiscovered in that oft-traversed area till identified by him in 1895 ; and *Hypochaeris glabra*, found (when in company with C. H. Waddell) at Magilligan. In both cases Lett's station remains the only Irish one for the plant.

To the Brambles he paid much attention, and his work, which had the great advantage of supervision by Rev. W. Moyle Rogers, added largely to our knowledge of this difficult group in the North of Ireland. He found more than one new form, among which his name is commemorated in *Rubus Lettii* of Rogers.

Canon Lett's energy expended itself also on archaeological pursuits, and though he did not publish much, he had a very good knowledge of local antiquities, both prehistoric and ecclesiastical. He was especially interested in the ancient Ulster frontier-defence known as "The Black Pig's Dyke" (see "Ulster Journal of Archaeology," vol. iii., 1897), and in cromleacs and other rude stone monuments. To this Journal he was a frequent contributor from the first volume until a few years ago. Residing at a distance from scientific centres, he was unable to take an active part in the work of the societies to which he belonged; but he served on the Committee of the Belfast Field Club from 1883 until 1889, and occupied the Presidential chair during the sessions 1912-13 and 1913-14.

Canon Lett was a good type of the amateur naturalist. Without the advantages of a scientific training, and living isolated from the influence and encouragement of fellow-workers, he acquired a wide knowledge of most groups of the plant world, and dexterity in the use of the microscope. He was a thorough field naturalist, with that eye for likely country that only comes with experience, and seldom comes fully to any but the country-bred. Possessed of an energetic and sanguine disposition, he ranged far, but sometimes lacked the caution and patience necessary when dealing with critical plants, thus bringing down on himself the criticism of that prince of caution, S. A. Stewart. He was an excellent companion, full of country lore and quaint experience, and his death leaves a conspicuous gap in the ranks of northern naturalists.

R. LLOYD PRAEGER.

THE DISTRIBUTION OF ARGYNNIS AGLAIA IN IRELAND.

BY REV. W. F. JOHNSON, M.A., F.E.S.

My own capture of this butterfly here and notes of its appearance in various localities made me look up the records of its occurrence in Ireland, and from the materials available I have made up the following table of its distribution, taking first the coastal counties and then those inland. The numbers denote the references:—

COASTAL COUNTIES.

- KERRY.—Kenmare (2), Ballybunnion (5).
- CORK.—Bandon, Desertserges, Rosscarberry (2).
- WATERFORD.—Ballinamore, Kilmedón (11), Portlaw (12).
- WEXFORD.—Ballyhyland (10).
- WICKLOW.—Greystones, Bray Head (2).
- DUBLIN.—Lambay (6).
- DOWN.—Dundrum (2), Newcastle (7).
- ANTRIM.—Portrush, Portballintrae (2, 15).
- LONDONDERRY.—Co. Derry (1), Londonderry District (3), Castlerock (7).
- DONEGAL.—Co. Donegal (1), Londonderry District (3).
- MAYO.—Hollymount (13).
- GALWAY.—Ardrahan (2), Recess, Inishmore (4), Clifden Roundstone (8).

INLAND COUNTIES.

- KILKENNY.—Mileport (11).
- KILDARE.—Curragh (9).
- ARMAGH.—Poyntzpass (14).
- FERMANAGH.—Tempo (16).

It will be seen from the above that this butterfly is by no means confined to the sea-coast, for many of these localities are at a distance from the sea, the Curragh, for instance, where it is said to be "locally common," being thirty miles from the coast.

It would be interesting to know of other localities for it in Ireland besides those mentioned. It will be seen that among the coastal counties there are no records from Meath, Louth, or Sligo, and twelve inland counties are also without records. The Donegal records are not very clear, as neither of the Messrs. Campbell mention specific localities.

I must congratulate Mr. Crawford and his son on the beautiful aberration which the latter captured at Portballintrae. It is the first aberration, as far as I know, recorded from Ireland. Mr. Kane, in his "Catalogue," does not mention any aberration, nor do any others who have recorded the capture of the butterfly in Ireland, so that the capture is very remarkable and should set lepidopterists looking out for varieties of this butterfly in Ireland. In England a good many varieties occur, and Mr. Barrett and Mr. South have figured several in their respective works on British Butterflies. One in which the basal silvery spots are united is called var. *Charlotta*. It was known, Mr. South says, to early entomologists as the "Queen of England Fritillary."

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13. W. RUTLEDGE. Argynnис aglaia in South Mayo. *t.c.*, p. 72.
14. REV. W. F. JOHNSON. Argynnис aglaia at Poyntzpass. *Irish Nat.*, xxix., 1920, p. 121.
15. W. CRAWFORD. An aberration of Argynnис aglaia. *Irish Nat.*, xxx., 1921, p. 15.
16. SIR C. LANGHAM. Notes on Lepidoptera. *t.c.*, p. 24.

Poyntzpass.

ORNITHOLOGICAL NOTES FROM MAYO AND GALWAY.

BY ROBERT F. RUTLEDGE.

THE following observations were made chiefly in the district round about Hollymount, and in South Mayo, but with them are some notes of observations made in Co. Galway :—

MISSEL THRUSH (*Turdus viscivorus*).—A large influx took place about August 24th last, flocks of nearly one hundred being often observed.

REDWING (*Turdus iliacus*).—The appearance of this winter visitor on October 7th last year was early for it in these parts. On October 12th I noticed flocks, large and small, in the woods and fields.

FIELDFARE (*Turdus pilaris*).—Since April, 1917, after the very severe winter of 1916-17, this species was entirely absent from the Hollymount district, the first re-appearance being on April 8th, 1919, when a flock of 30 were observed. During last spring they were again plentiful throughout this part of the country. They did not re-appear in this demesne until January 4th, 1920.

CHIFF-CHAFF (*Phylloscopus rufus*).—Owing, probably, to the ungeniality of the season, this bird, with one exception, did not recommence to sing last autumn.

YELLOW BUNTING (*Emberiza citrinella*).—The late Mr. Robert Warren noticed the entire disappearance from the Ballina district in September. Here in South Mayo I notice there is very little decrease in numbers. I took particular notice of this species during the past September.

SKYLARK (*Alauda arvensis*).—The immigration in October is well marked here. I find a note in my diary of 1917 to the effect that, on October 6th, numbers of Skylarks were passing north all morning. Again, last year, on October 7th, all the morning I observed Skylarks flying high N., N.E. and E., but chiefly to the N.E., and so high that in many cases one could only hear them.

PIED WAGTAIL (*Motacilla lugubris*).—On October 2nd, when driving between Bunowen and Clifden, in western Connemara, I observed parties of half a dozen or more Pied Wagtails at various places along the road. I also observed many on the shores of Killary Bay between August 10th and 14th, 1920.¹ I saw a flock of as many as 14 Pied Wagtails on October 4th, 1920; mostly immature birds.

SWALLOW (*Hirundo rustica*).—First seen last year on April 10th, which is earlier than its usual date of first appearance here. A pure white specimen was seen on three occasions at Bloomfield, on September 12th, 1920. It was only observed on this one date.

SAND MARTIN (*Cotile riparia*)—I observed this species at a nesting site on the north, or Mayo, shore of Killary Harbour, on August 13th, 1920. The nesting site was in a high bank overlooking the harbour.

BULLFINCH (*Pyrrhula europaea*).—This bird seems to be increasing steadily in South Mayo.

NIGHTJAR (*Caprimulgus europaeus*).—This bird is undoubtedly increasing and spreading in South Mayo. I observed more last autumn than ever before. There is evidence of its having bred in Bloomfield demesne in 1919.

KINGFISHER (*Alcedo ispida*).—I observed several Kingfishers on the shore of Clifden Bay, Co. Galway, on Sep-

¹ It is not very common in the extreme West of Connaught (Ussher & Warren's "Birds of Ireland," p. 35).

tember 20th, 1920. One bird was quite close up to the quays. On October 11th, while looking for Dippers, I observed at least one Kingfisher on a mountain stream.

CUCKOO (*Cuculus canorus*).—Made an early appearance here last year, being first heard on April 20th, while in 1914, 1915, 1916 and 1918 it was first heard on April 27th, and in 1917 on April 25th.

PEREGRINE FALCON (*Falco peregrinus*).—Although this bird breeds and is not uncommon on the coasts of Mayo and Galway, I had never before seen it inland during the summer months. During August and September of last year, however, Peregrines were observed inland by my brother and me on four occasions, the occurrences being as follows:—One, immature, flying low over Lough Carra, on August 18th; an immature bird over the Corrigeen Islands, Lough Mask, on September 6th; one, 15th September, near the Cow Islands, Lough Carra; on October 1st one was seen giving chase to a Green Plover over Lough Carra—the bird was probably a female, but was seen at some distance.

CORMORANT (*Phalacrocorax carbo*).—The Cormorants which inhabit Hog Island, Lough Carra, do not appear to frequent that lake in numbers during daytime. Many spend the day fishing on Lough Mask, and the majority on Lough Corrib. Every evening, however, the birds return regularly at sun-down to roost on Hog Island.

SHOVELER (*Spatula clypeata*).—This is a rapidly increasing species in South Mayo, and breeds. I observed over twenty birds feeding at Lough Deen, Co. Mayo, on August 30th, 1920. This is the first time I have met with Shovelers on that lake, and my first observation of them in this district in August.

WIGEON (*Mareca penelope*).—Several were observed on Lough Deen on April 29th, 1920—a late date to meet with them. A flock of from fifteen to twenty were observed at Cloon Lough, Co. Mayo, on October 11th, 1920—the first seen last autumn.

RINGED PLOVER (*Aegialitis hiaticola*).—Evidently bred at Lough Deen, Co. Mayo, again last year, young birds were seen there on July 15th.

COMMON SNIPE (*Gallinago coelestis*).—Evidently a large influx took place about August 30th, as on that date Snipe were very abundant everywhere—previously there had not been half the number.

CURLEW (*Numenius arquata*).—Never before, I think, have I observed such large flocks of Curlew frequenting the bogs, as I saw last July. By the end of August, however, Curlew were comparatively scarce on the bogs in this district.

WHIMBREL (*Numenius phaeopus*).—The first sign of the return migration was on August 6th, when a single bird was observed at Bloomfield, flying S.W.; wind W.N.W., with driving mist. The bird was identified by its call and was at some little distance. This date is slightly early for its re-appearance here. The southward movement was also well marked on August 9th, 18th, and September 13th on Lough Carra; and on August 23rd a flock of 30 were seen flying over Lough Mask, but not in any definite direction.

GENERAL OBSERVATION ON ARRIVAL OF MIGRANTS.

The Warblers were unusually late in their first appearance in 1920; the Willow Wren did not arrive until April 13th, a week later than usual, and the Chiff-chaff, which usually appears during the last week in March, was not heard until April 7th. On the other hand, the Swallow and Cuckoo were earlier than usual. The Cuckoo, which for three years running has first been heard on April 27th, was heard last year on April 20th.

The Whimbrel, too, was late in its first appearance, being seen, true to its name of May-bird, on the 1st May, whereas in 1917, 1918 and 1919 it appeared on April 23rd, 24th and 21st respectively.

Bloomfield, Hollymount, Co. Mayo.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 15.—A lecture was delivered by J. R. H. GREEVES on "Sea Birds," the President (S. A. Bennett) being in the chair. The lecturer dealt with the auks, terns, and gulls, leaving the rest of our numerous sea birds for future consideration. In the course of his address, which was illustrated by a series of lantern slides, most of which were new to members of the Club, and a fine show of preserved specimens from the Belfast Museum, he demonstrated the common descent of the above-mentioned families from an ancestor which must in some respects have resembled the modern plover. Mention was made of discoveries by members of the Club and others in recent years, such as the breeding of the Great Black-backed Gull and Herring Gull in County Down in 1920; the Sandwich Tern in Strangford Lough in 1906, the first and almost the only record for the district; and the first inland breeding-place of the Herring Gull in Ireland on the Antrim hills, in 1902. The Club is particularly indebted to the Belfast Museum authorities for specimens of Bonaparte's Gull, shot on the Lagan in 1848, and Sabine's Gull from Belfast Lough in 1822, which were much admired.

The paper was spoken on by Professor Gregg Wilson, Rev. W. R. Megaw, N. H. Foster, J. A. Stendall, and the President, and the meeting closed with the election of one new member.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 10.—ATHOLE HARRISON dealt with the subject of "Bird's Eggs," pointing out how remarkably those of different species differ in shape, number, and colour, and offering suggestions (many of them grounded on his own experience) as to the probable reasons for such variation. After a short discussion on Mr. Harrison's paper, J. de W. HINCH gave an account of the evidence recently collected in proof of Post-Glacial variations in the Irish climate, showing by strong cumulative testimony that during a part of the period that followed the Ice Age our summers must have been considerably warmer than they are now. Specimens of many of the marine animals that formed the basis of the argument were exhibited, and evoked much interest.

MARCH 10.—F. W. R. BRAMBELL read a paper on "The Crossbill, Siskin, and Brambling in Co. Wicklow." He referred to the general range of these birds in the Old World and in Ireland, and described their habits in connection with feeding, nesting, etc. Their coloration in relation to protection was also dealt with.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Mandrill from the President, a Leopard, a Puma, and two Brown Bear cubs from the Royal Scottish Zoological Society ; Rabbits from Mrs. Brooks, Miss A. McCabe, and Dr. Leeper, Alexander Parrakeets from Mr. J. P. Fox, a Golden Pheasant from Dr. Bell, a Silver Pheasant from Mr. A. K. Sheridan, a pair of Ring doves from Miss Trench, and 10,000 Brown Trout ova from the Earl of Dunraven.

Three Rhesus Monkeys, a Sooty Mangabey, two Grey Lemurs, a Mute Swan, and 12,000 Brown Trout ova have been purchased. A Lesser White-nosed Monkey, a Grey Parrot, Stanley, Rosella, and Grass Parakeets, Peach-faced Love-birds, Diamond Doves, Cormorants, and a Yucatan Jay have been received on deposit.

N O T E S,

ZOOLOGY.

Irish Hymenoptera Aculeata : some Corrections.

I submitted specimens belonging to the difficult genera *Sphecodes*, *Halictus* and *Andrena* to Dr. R. C. L. Perkins, F.R.S., who has named them for me, and I am deeply indebted to him ; as a result I have to make the following corrections of records in the *Irish Naturalist* :—

- 1907, p. 245 .. *Sphecodes gibbus* L. = *subquadratus* Smith, and *ferruginatus* Schk.
- Andrena rosae* Panz. = *trimmerana* auct., var. *scotica* Perkins.
- 1916, p. 62 .. *Halictus malachurus* K. Poyntzpass = *albipes* K.; Coolmore = *cylindricus* Fab., and = *freygessneri* Alfk.
H. longulus Smith = *cylindricus* Fab.
H. pauxillus Schk. = *albipes* K.
- p. 172 .. *H. longulus* Smith = *albipes* K.
- 1918, p. 3 .. *Sphecodes dimidiatus*, v. Hag. = *ferruginatus* Schk., and = *hyalinatus* Schk.
Halictus longulus Smith = *cylindricus* Fab.
H. pauxillus Schk. = *freygessneri* Alfk.
H. minutus K. = *albipes* K.
- 1919, p. 7. .. *Sphecodes gibbus* L. = *affinis*, v. Hag., large female, or, *variegatus*, v. Hag.
S. subquadratus Smith = *affinis*, v. Hag.
Halictus leucozonius Schr. = *albipes* K.
H. subfasciatus, Nyl. = *freygessneri* Alfk.
- p. 133 .. *H. malachurus* K. = *albipes* K.
H. subfasciatus Nyl. = *freygessneri* Alfk.

I should explain that *Sphecodes affinis* in the female is practically impossible to distinguish satisfactorily from the same sex of *S. variegatus*.

Poyntzpass.

W. F. JOHNSON.

"Song and Nesting of Birds."

I was greatly interested in Mr. Burkitt's thoughtful article on the above subject, partly because I had just finished reading a paper on pretty much the same subject, entitled "The Singing Tree, or how near to the nest do the male birds sing?" This paper is by H. Mousley and was published in the *Auk* for July, 1919. Mr. Burkitt's main point is to show that with at least a number of birds mating puts a brake or stopper on song, and that we should have comparatively little song if it was not for un-mated males. Mr. Mousley, on the other hand, seems to come to rather the opposite conclusion in his study of American Warblers, etc., in which he proves that the males were always in evidence during the nesting season. He was led to this conclusion by the great difficulty he had in locating the nests of the various species of warblers under his observation; it suddenly occurred to him to pay special attention to the males which were singing in special trees or places, and he found that by drawing an imaginary circle round the singing male he could generally locate the nest, the circle varying from four to thirty yards and up to even fifty yards; and he goes on to say that the more he has been able to study the singing ways of the male birds at nesting time the more he has been able to perfect his system, but to find the nest he says it is essential for his system to have a singing male. He then gives a list of various species which he has successfully experimented with; this includes Warblers, Sandpipers, Larks, Finches, Thrushes, Waxwings, etc., all of which were singing during the nesting season. This, in conclusion, I think makes quite an interesting comparison between our species and their American cousins. Mr. Burkitt points out that even in England there is much more singing amongst birds than in this country, could it be possible that owing to our milder winters birds start singing earlier than in England or America and consequently stop earlier or about the time the nesting season commences.

W. H. WORKMAN.

Belfast.

Bittern in County Antrim.

I was most fortunate in securing a beautiful male specimen of the Common Bittern, *Potaurus stellaris*, at Rangecroft's poultry shop. It was shot by a local gunner at Mosley, on Thursday, 13th January, 1921, and according to Ussher and Warren no previous record is given for county Antrim although twenty-one records are given for County Down. The curious moulted appearance of the back of the neck was very noticeable in this specimen, which, according to Kirkman's "British Bird Book," is the usual condition, as contour feathers do not grow on the back of the neck of this species.

W. H. WORKMAN.

Belfast.

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Royal College of Science, Dublin.

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GENERAL IRISH NATURAL HISTORY.

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EDITED BY

Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.

AND OTHERS

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THE MUSEUM, HULL;

AND

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VARIATIONS IN THE SEGMENTAL SPINES
OF THE FOURTH-STAGE LARVA OF
HYPODERMA BOVIS.

BY G. B. PHIBBS.

SINCE the discovery of the newly-hatched maggot, four stages are recognised in the larval history of the Warble-fly. These four stages are very distinctly differentiated one from another. There is however some difference in appearance between what is known as the young fourth-stage larva and the "ripe" maggot. A careful comparison of the spines, which arise on certain areas of the cuticle,

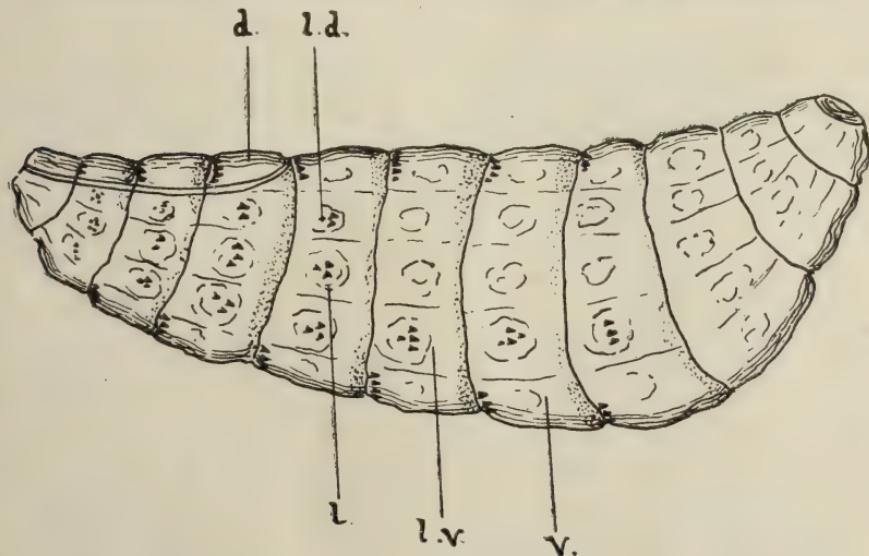


Fig. 1. Fourth stage Larva of *Hypoderma bovis*. Lateral View. $\times 5$
Areas of Segments indicated : d., dorsal ; l.d., latero-dorsal ; l., lateral ;
l.v., latero-ventral ; v., ventral.

was therefore undertaken with a view to ascertaining, if possible, whether there are not more than these generally accepted four larval stages. It was soon seen, however, that considerable variation occurs in the spiny armature of the full-grown warble maggot (*Hypoderma bovis*). This is noticeable as regards the number, relative distribution size and shape of the spines.

Each of the eleven segments of the mature larva is readily divisible into eight distinct areas (Fig. 1.) :—a dorsal area (*d*), a ventral area (*v*), and on each side a latero-dorsal (*l.d.*) a lateral (*l.*) and a latero-ventral area (*l.v.*). Spines are not borne on all these areas. In *Hypoderma bovis* the ninth, tenth and eleventh dorsal areas are devoid of spines, as also are the tenth and eleventh ventral and the ninth, tenth and eleventh latero-ventral areas ; while the latero-dorsal and lateral areas bear no spines after the fifth segment.

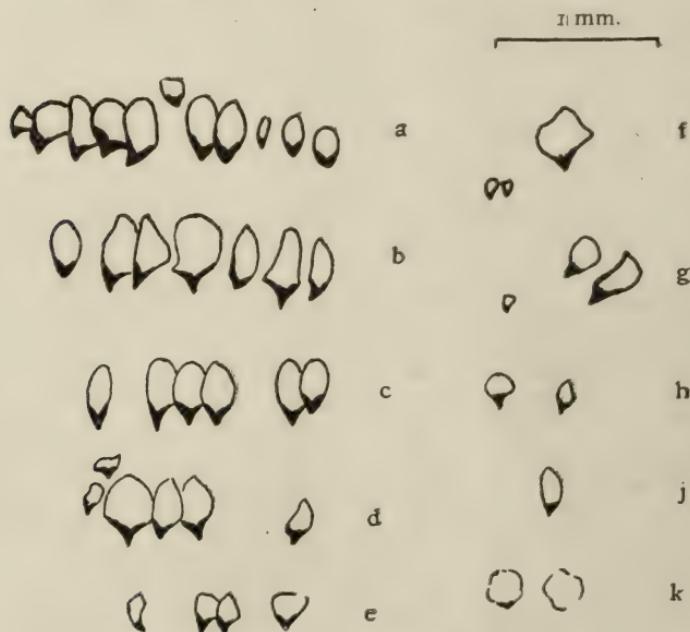


Fig. 2. Variation in the spiny armature of the right eighth latero-ventral area in ten specimens (a-k) of the fourth-stage larva of *H. bovis*. X 20.

The variations occur not only on corresponding areas in different specimens but also on corresponding areas on the right and left sides of the same specimen. The diversity may be observed on any area that is selected for comparison. It is well marked, for example, on the "bosses" of the latero-ventral areas. Here the spines, pointing away from the head, are frequently of a very irregular shape. They are in some cases quite conspicuous, but in others are

hardly to be distinguished from the horny platelets of the cuticle. Various stages of development between plates and spines may be observed.

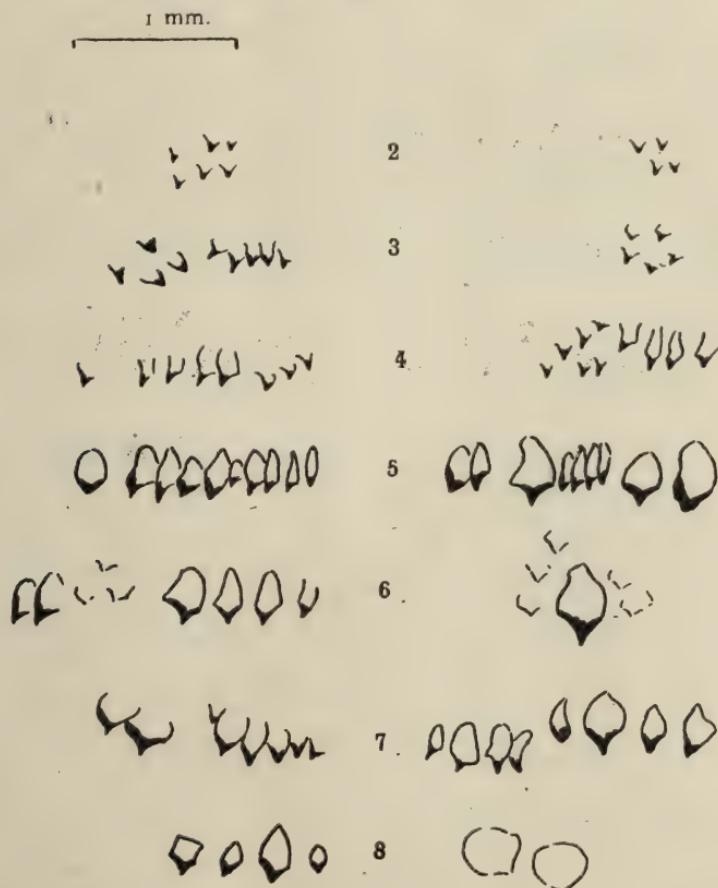


Fig. 3. Comparison of spines on the latero-ventral areas of the right and left sides of a single *H. bovis* fourth-stage larva, $\times 20$. The numbers indicate the segments.

The eighth latero-ventral area was chosen for comparison in ten specimens. The results of this comparison are indicated in fig. 2. All the spines are simple; that is to say each spine has only one point. In number they range from one (j.) to eleven (a.). In one or two cases true spines can hardly be said to exist on the area at all (k.). The spines are irregularly arranged in a single line, with, in one or two cases, an odd spine below. In size and shape the

differences are very marked. The majority are large somewhat irregular "scale-spines," but there are also small conical tooth-shaped spines or "denticles."

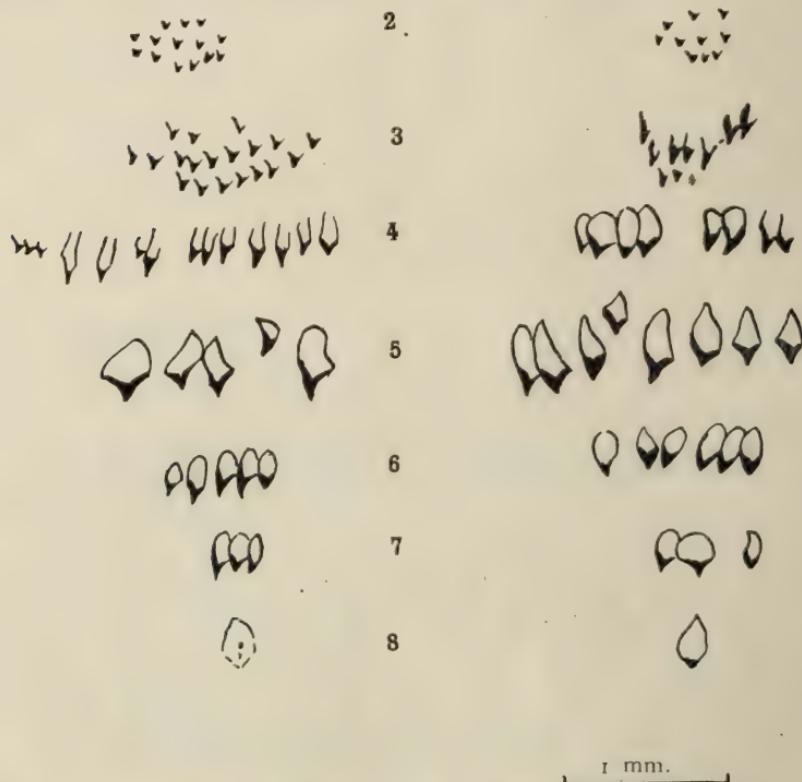


Fig. 4. Comparison of spines on the corresponding areas of another specimen of the same. $\times 20$.

The comparison of the latero-ventral areas on the right and left sides of a single specimen show variations quite as considerable as those in different specimens. In one case (fig. 3.) the eighth area on the right side have no real spines, whereas on the left they are four in number, two scale-spines and two denticles, all small though well developed. Similarly on the sixth latero-ventral area the right side has one large scale-spine as against six medium-sized spines on the left.

Similar numerical variations were found on all the segments of this and other specimens (see fig. 4.); in some segments the right side bearing a preponderance of spines,

in some the left. The spines become smaller and very much more uniform on the areas nearer the head. The third and fourth segments appear to carry, in most cases, the greatest number of spines. Those of the largest size are generally to be found on the fifth segment.

The differences were seen to be quite as great in the so-called young fourth-stage larvae as in the old specimens about to pupate.

From the above facts it will be obvious that the number and appearance of the spines cannot be taken as giving any indication that the Warble-fly passes through more than four larval stages.

Royal College of Science, Dublin.

SOME RECORDS OF WOODLICE.

BY DENIS R. PACK-BERESFORD, M.R.I.A.

MR. R. A. PHILLIPS has been good enough to send in some Woodlice collected lately by himself in the Counties Clare, Galway and Tipperary. Amongst these there are three finds that are worth recording.

Trichoniscus vividus (Koch).—A single specimen from Menlo, Co. Galway, N.E. This is quite an interesting record as this species has only previously been taken in the south-eastern Counties, viz.;—Queen's Co., Carlow, Kilkenny, Waterford and Wexford, with a single record from North Kerry (Dingle, A.W.S.).

Trichoniscus pygmaeus, G. O. Sars.—A single specimen also from near Menlo, Co. Galway, N.E.

Haplophthalmus Mengelii, Zad.—Five specimens from Portumna, Co. Galway, S. This little species seems to range all over Ireland, but is nowhere common, and has not previously been taken in Co. Galway.

Fenagh Ho., Bagnalstown.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

JANUARY 21.—THE ANNUAL GENERAL MEETING was held in the Royal Dublin Society's Lecture Theatre, the President (SIR FREDERICK MOORE) in the chair. The Hon. Secretary (PROF. A. FRANCIS DIXON, Sc.D.) presented the report and accounts and moved their adoption, which was seconded by SIR ROBERT WOODS, M.Ch., M.P., supported by REV. W. O'N. LINDESAY, and carried unanimously.

The Report dwells on the difficulties experienced during 1920 through the curtailment of railway traffic and the disturbed state of the country, and the high price of food and coal. It has been abnormally difficult to secure new animals, but the grounds and houses are in excellent condition and many improvements have been carried out. Despite the strictest economy, the year closed with a bank overdraft of £621, and the Council appeals for a great increase in the membership. During 1920 there were elected 62 annual members and 19 life members. The Gardens were visited by 159,783 persons, the gate receipts amounting to £3,009. The Society has £2,000 from the profits of the 1919 Fete invested. A Fete lasting for ten days was held at the end of June, 1920, for the special object of raising funds to defray the cost of the proposed enclosure for bears. A sum of £700 resulted from the effort, and the Council records its thanks to the many ladies and gentlemen who gave in this connection splendid service to the Society; the Fete not merely brought in a substantial sum, but also helped to increase public interest in the Gardens. Thanks are especially due to Lady Fitzgerald Arnott, Lady Moore, and Mr. and Mrs. Knox Peebles.

During the year the Nesbitt Aviary has been re-roofed and the roof of the Anthropoid House has been repaired. A complete German submarine periscope was presented to the Society by the Royal Navy War Trophies Committee in February, 1920. It has been erected in the loft over the Elephant House, for which a new floor and an outside staircase have been provided. Through the periscope a beautiful view of the gardens and surrounding country can be obtained, and it has been inspected by many interested visitors. The periscope proved one of the attractions at the Gardens during the Fete. The main grass-plot has been levelled and resown, and the garden walks repaired and gravelled. Work on the new bear enclosure has been commenced, and it is hoped that the cages will be ready for their owners early in the New Year. The balconies, stairs, and entire woodwork of the Haughton House have been repaired and repainted. Altogether over £1,200 has been spent on necessary repairs to buildings.

During the year the Gardens lost by death two of their most popular inmates, "George" and "Charlie." Both of these Chimpanzees had lived in the Anthropoid house for just six years, and had always delighted visitors by their liveliness and by the friendly interest they took in mankind. "George," the elder of the two, had become feeble for some months

before his death, but "Charlie" was ill only for a very short time. The actual cause of death is believed to have been inflammation in connexion with the colon and peritonitis. The Council is glad to report that the surviving Chimpanzee, "Fanny," is in excellent health, and in good condition. She is more uncertain in her disposition than were either "George" or "Charlie," but she is in many ways more clever, and prone to playing unexpected tricks upon her friends.

An American Bison bull calf was born in the Gardens, and is doing well. It is the third Bison calf which has been reared in Dublin since the Canadian Government presented the pair of Bison to the Gardens in 1913. A handsome Crested Porcupine was purchased during the year, and occupies a cage beneath the Haughton House. The Council was fortunate in being able to acquire a great Kangaroo and a black-tailed Wallaby, both of which are doing well in one of the glass-roofed cages which, in the years before the war, were devoted to Marsupials.

"Sandari," the young Indian Elephant presented to the Society in June, 1913, by the Maharajah of Mysore, has grown to seven feet one inch in height. She is extremely docile, and following the instructions of her devoted keeper, has acquired many interesting accomplishments. Since she came to Dublin she has gained two feet four and a half inches in height, an average growth of just over four inches a year. The following figures give her height in each year since she came:—

	ft. ins.		ft. ins.
3 years old . . .	4 8	7 years old . . .	6 2½
4 " " . . .	5 1	8 " " . . .	6 5
5 " " . . .	5 7	9 " " . . .	6 10
6 " " . . .	5 11	10 " " . . .	7 1

The stock of Lions now consists of six males and eight females. "Menelik," the old Abyssinian Lion given some years ago by the King, died, while a pair of Dublin-bred animals, "Seamus" and "Nuala," were sent during the year to renew the stock in the Zoological Gardens of Antwerp.

The Poultry Exhibit continues to attract much interest, and is being extended. It is still in charge of an instructress nominated by the Department of Agriculture, and towards whose salary the Department makes an annual grant. Several new houses have been obtained, and an increased number of birds, representing a greater number of types, is now stocked. Among the latter are a number of birds bred from parents with great egg-laying records. The Council desires to express its thanks to the Department of Agriculture for its continued help, and especially to Mr. Nasmyth Miller, the Department's expert.

Early in April the Council arranged to hold a series of classes in the Gardens for Boy Scouts. It was thought that such classes would not only prove of interest to the boys, but would help them in preparing for their naturalist badge. Several members of the Council and the Superintendent undertook to share the work, and the classes were begun on the first Saturday in May, and held in the early afternoon on each of the

six following Saturdays. At the end of the course an examination was held for those who had attended regularly. In all, 23 Scouts attended, representing several different troops, but unfortunately many came very irregularly. Six Scouts passed the examination, and the first place was obtained by Charles Gibbs, of the Harold's Cross Troop.

The Council expresses sincere gratitude to the Hon. Secretary, Prof. A. F. Dixon. At the urgent request of his colleagues he accepted that office at a time not only critical in the affairs of the Society, but also one during which his professional duties have been especially onerous, and the Society owes much to his energy, devotion, and ability.

As a result of the ballot, the President announced that the following had been elected to fill the three vacancies on the Council :—F. Conway Dwyer, M.B., Charles B. Moffat, B.A., and C. Wisdom Hely, J.P.

At the conclusion of the formal business, Professor G. H. CARPENTER gave a lecture entitled " Societies and their Members." This was illustrated by many beautiful lantern slides, and followed by an exhibition of two cinematograph films illustrating animal life.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 1.—ANNUAL CONVERSAZIONE.—A company of 175 members and friends met at 6 o'clock in the Carlton Hall. The zoological exhibits included a demonstration of the method of determining the age of fishes by means of their scales and otoliths, by Professor Gregg Wilson, M.A.; cases showing trapdoor spiders, Tarantula spiders, and Trinidad snails, by the Belfast Municipal Museum; eggs of Guillemot, showing variation in colour, by J. R. H. Greeves; cases of Indian butterflies and Indian birds, by W. M. Crawford, B.A.; exotic birds, by C. B. Horsbrugh; gramophone records of songs of Nightingale, Blackbird, and Thrush, by T. Edens Osborne; animal photographs, by E. Armstrong; and local moths, by H. Malcolmson.

The botanical exhibits included freshwater algae, with macroscopical and microscopical exhibits, by Miss M. W. Rea, B.Sc.; local mosses living and the same mosses as museum specimens, by William Porter and Rev. W. R. Megaw; the Toothwort parasitic on Hawthorn and a collection of local plants, by N. Carrothers; local Mycetozoa, by the Belfast Municipal Museum; plants recently collected in County Antrim, by R. Ll. Praeger, M.R.I.A.; encrusted Saxifrages in flower and a form of Scaly Spleenwort, by William Porter; fungoid diseases of plants, by the Municipal Museum; *Carex divulsa* from its three stations in County Down, and pondweeds of Down and Antrim, with distribution maps, by the President (S. A. Bennett, B.A., B.Sc.); some sphagnums of the British Isles, by J. Glover; types of local mosses in fruit, by Rev. W. R. Megaw; the Brazil nut of commerce and the artichoke in flower, by N. Carrothers; sunflower, showing reversal of geotropic curvature in an atmosphere of carbonic acid gas, by Mrs. M. T. Lynn, B.Sc.

The geological exhibits included Trilobites from the Upper Silurian, by Mr. and Mrs. A. M'I. Cleland; fossil Nautili from the Lias and the Upper Chalk, with nautilus in section and a recent nautilus, by R. Bell, F.G.S.; set of thin sections of igneous rocks, showing certain structures exhibited by means of microscopes, by Dr. A. R. Dwerryhouse, D.Sc., and Miss D. Reynolds, B.Sc.

The archæological exhibits included a fine collection of early pottery and encaustic tiles, by H. C. Lawlor; fragments of Neolithic pottery from Whitepark Bay, by Mrs. Metcalfe; sections of wooden pipes formerly used for Belfast water supply, by A. M'I. Cleland; brass snake of Indian workmanship, by William M. Crawford, B.A.; early book on botany, with hand-coloured plates and examples of early envelopes, by Miss Mawdsley.

After a few remarks by the President and the election of three new members tea was served in the restaurant at 8.15 p.m., and a very pleasant evening brought to a close.

NOTES.

ZOOLOGY.

Armadillidium vulgare.

The distribution of *Armadillidium vulgare* Latreille in Ireland has more than once been commented upon. This Woodlouse has not been found north of a line drawn across Ireland from Galway to Larne, and but for two localities in Armagh and Antrim the eastern terminus of this line could have been placed many miles further south. In Munster it is not uncommon, except in South and North Kerry, where it has not yet been found. It is very common throughout Leinster, though still unrecorded from Longford. Except for two localities in S.E. Galway, it has not been found in Connaught. From Ulster it was long believed to have been absent, but closer search has been rewarded by the finding of a few specimens at Carrickmacross and at Navan Fort and Umgola (both near Armagh City), in the counties of Monaghan and Armagh respectively—each of these localities being on the limestone. A large colony was discovered at Magheramorne, Co. Antrim, by A. W. Stelfox. Here it is possible it was artificially introduced by a ship discharging ballast, as it exists in company with some species of mollusks and plants not native in this district. In Co. Down it resides in small numbers in the southern part of the county—Ardglass, Killough, Portaferry, Downpatrick and Newry, though apparently not at Annalong or Kilkeel. Recently I discovered a very numerous colony on the bank of the river Bann at Laurencetown, and it may be mentioned that this locality is less than a mile from Seapatrick, where

R. J. Welch obtained it in 1909. At Laurencetown in the course of half an hour I observed probably 200 specimens of this species, while only 1 *Trichoniscus pusillus*, 4 *Philoscia muscorum* and about 12 *Oniscus asellus* were seen.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

Chelifer scorpioides Herm., a False-Scorpion new to the Irish Fauna.

Through the kindness of Mr. Denis R. Pack-Beresford I have recently seen this Chelifer, a single specimen, taken by him during the past winter from vegetable debris from one of his woods at Fenagh, Co. Carlow. The Irish list, rich both in Obisium and Chthonius, is remarkably poor in Chelifer, so that the addition of the present species is of much interest.

H. WALLIS KEW.

London.

Lepidoptera at Dollymount, Co. Dublin.

During the summer of 1920, I spent some time collecting Lepidoptera in this locality, and append some records of the more interesting species met with.

Like nearly all seaside places, Dollymount is a "breezy" hunting ground. I scarcely remember one day last summer there was not a stiff wind blowing, which is not a favourable state of affairs for obtaining butterflies and moths. Amongst the butterflies *Pieris brassicae* was scarce in the early summer but very numerous during the autumn. *Euchloe cardamines* was rare, only three specimens being observed. During July I observed *Colias edusa* in a field on the sea-shore, several females, all in good condition; later in the same month specimens were captured in one of the little valleys between the sand-hills on the North Bull bank opposite Dollymount. The species has been recorded from Clontarf and Howth.

During the summer of 1918, the district was swarming with the Small Tortoiseshell, *Vanessa urticae*; one could see them in hundreds, and notwithstanding that the nettles were covered with thousands of their black caterpillars, hardly a specimen was to be seen during last summer, which is remarkable, as it usually is one of the most abundant butterflies in the locality. *Vanessa io* was scarce; observed only about half a dozen during the summer. During the month of August there was a remarkable number of *Vanessa atlanta*. They could be counted by the dozen in the gardens of the houses upon the sea front; a few remained until the end of September. Two specimens of *V. cardui* were captured, and a fair number of *Hipparchia semele* on the North Bull.

Amongst Moths the following may be noted:—*Smerinthus populi* was found at rest on wheat stalks; *Chaerocampa elpenor*, one specimen; *C. porcellus*, fairly numerous; *Macroglossa stellatarum*, frequent; *Agrotis praecox*, two specimens caught flying in garden, visitors, no doubt, from the North Bull sandhills. *Naenia typica* and *Chariclea umbra* one of each caught flying to flowers in garden, a few *Leucania lithargyrea* were secured in the same way. Amongst the Geometers a few *Urapteryx sambucaria* were observed, and a male of the local *Biston stratarius* was captured in a tramcar, flying around lamp inside, an unexpected species and apparently a new record for North Dublin.

I also observed a fair number of *Aphomia sociella* and a few *Zanclognatha tarsipennalis* in the garden.

F. H. WALKER.

Dollymount, Dublin.

Argynnis aglaja in Co. Tyrone.

The Rev. W. F. Johnson, in his interesting paper (pp. 44-6 *supra*) on the distribution of *A. aglaja* in Ireland, has overlooked the records for this county, viz., a specimen taken near Grange, Cookstown, on August 28th, 1920, *Irish Nat.*, vol. xxix., 1920, p. 132; and Prof. J. W. H. Harrison observed the species on several occasions, flying along the steep slopes, covered with heather and bracken, at Lough Fea (*Entomologist*, vol. li., 1918, p. 220).

THOMAS GREER.

* Stewartstown.

Iceland Falcon in Co. Kerry.

Early in 1920 a bird of this species visited Inishtearaght, and was observed by Mr. Kennedy, one of the lightkeepers. He took notes on its behaviour:—

"January 13th.—Observed close to balcony of lighthouse, devouring a Razorbill. The bird was light grey in colour.

"It left the rock on that date, but reappeared in April and stayed three days. On this occasion it sat quite close to a window when feeding. It was most interesting to watch it in flight catching its prey. For instance, one day I saw it catch a Guillemot, which was flying in the opposite direction. It appeared to me as if the falcon could not get its talons to support the bird to bring it to the feeding place. When quite close to the cliff it released the Guillemot with great force, killing it against the cliff. It now swooped down and picked up its prey, which it brought to the highest pinnacle of the rock.

"On the third day it took its departure, going south."

W. RUTTLEDGE.

Bloomfield, Co. Mayo.

Notes on some Irish Birds.

During a slight snowstorm on February 20th, 1918, in Rathmines, I observed a Yellow Wagtail which was sheltering for a short while in a lane. I had it under observation for several minutes at a distance of less than twenty feet through a pair of field glasses, and I am quite convinced that my identification was correct. This appears to be an unusually early date for this species.

On the 2nd October last year, while along the North Bull Wall, I saw a party of Sandwich Terns feeding and resting there. Their large size and only slightly forked tail were very obvious. This species does not, I believe, usually occur in Dublin Bay.

Grey Phalaropes usually occur here in October and November off the Irish coast, so the appearance of a party of over a hundred of these on the North Bull on March 13th of this year is a rather exceptional date. These birds which I saw were very tame, and I was able to approach within five yards of some of them, so that my field glass was hardly needed. I am quite certain that I did not mistake them for any other bird, such as the Sanderling.

While at Luggela, Co. Wicklow, on April 1st last, I observed a Raven on the hillside on the south of the lake. I am well acquainted with this bird, which is much more plentiful in the Isle of Man, my native land, than it is here, and its hoarse "croaking" was very distinctive. I am informed that Ravens are very rarely observed in Co. Wicklow, and my own observations would serve to confirm this.

A. HARRISON.

Terenure, Dublin.

Serin in Queen's County.

In a list of birds observed at Granston Manor, Queen's Co. sent to me by Lord Castletown, the record of two pairs of this rare species may be of interest to readers of the *Irish Naturalist*.

G. C. MAY.

Littlehampton.

BOTANY.

A new Station for *Cardamine amara* in Tyrone.

This local plant was found in abundance on April 2nd, 1921, within half a mile of the village of Coagh, on the Ballinderry river.

THOMAS GREER.

Stewartstown.

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MARGARET GREER FLOOD.

WE have to record the loss which science in Ireland has sustained by the untimely death of Margaret Greer Flood, B.A., on the 3rd May last. The funeral at Mount Jerome Cemetery was attended by many friends and sympathisers, who retain the memory of a refined and enthusiastic character, much beloved by her fellow-students both at Trinity College and the Royal College of Science. Born in Dublin in 1896, her life was short ; but it promised much, and the small band of Irish naturalists mourn their youngest and brightest recruit. It is not for us to speak of the void left in the circle of her relatives and intimate friends, whose poignant grief was so heart-breaking as she was laid to rest. We can but chronicle the brief facts of her public life.

Educated at Norfolk College, Rathgar, she entered Trinity College in 1914, where her career was a distinguished one. Prof. Henry H. Dixon, F.R.S., under whom she worked at botany, says : " She more than once obtained first-class honours in Natural Science, and in October, 1918, she won Senior Moderatorship, the subjects being Botany, Zoology, and Geology. She submitted at that examination, as part of her research work, an investigation on the 'Exudation of Water by *Colocasia antiquorum*,' which was afterwards published in the *Proceedings* of the Royal Dublin Society, vol. xv. No. 36 (April, 1919), and reprinted in 'Notes from the Botanical School, T.C.D.' This work established the existence of continuous passages connecting the vessels of the wood of the leaf with the exterior, and showed that there is no epithema on the leaf-tip responsible for the exudation. In May, 1920, Miss Flood gained at Trinity College a scholarship in Natural Science."

Miss Flood obtained a grant from the Department of Scientific and Industrial Research to enable her to receive training in Forest Botany at the Royal College of Science, Dublin, under the writer of this notice, and she carried out research work there from 1st December, 1918, until 31st March, 1920. The results appear in three papers published under the joint names of Augustine Henry and Margaret

G. Flood in *Proceedings* of the Royal Irish Academy, vol. xxxv., Section B, as follows :—

April, 1919—No. 2. "The History of the London Plane, *Platanus acerifolia*, with notes on the genus *Platanus*."

September, 1919—No. 4. "The History of the Dunkeld Hybrid Larch, *Larix eurolepis*, with notes on other Hybrid Conifers."

May, 1920—No. 5. "The Douglas Firs: a Botanical and Silvicultural Description of the various Species of *Pseudotsuga*."

Miss Flood's share in these papers represent a vast amount of painstaking labour, which has helped to solve some problems of considerable interest to foresters and systematic botanists.

In April, 1920, Miss Flood rejoined Trinity College as Demonstrator of Zoology for a brief period; and then, on October 14th, 1920, she was appointed Technical Assistant in the National Museum, a post which opened out to her a career, where her acquirements and talents would have had full scope. Dr. R. F. Scharff writes to me on the 18th May: "Miss Flood felt too unwell on the 15th March to continue her work, and we all thought she must have contracted some form of influenza and expected her to be back soon. And then came the long and painful illness from which she never recovered. We have only had her services for five months. From the moment of her arrival in the museum I felt that we had made a unique discovery. Her charm of manner, her strong character and keen interest in Natural History impressed me particularly. Only one accomplishment she lacked which I thought would be useful to her as Technical Assistant, namely, typewriting; and she began at once to acquire it. A few weeks after, she was able to type well and then started the catalogue of the large number of pamphlets which had accumulated during the war. Meanwhile she was busy mounting specimens in spirit for exhibition, and re-arranging and re-labelling the fossil invertebrates. It must be remembered that for years before Miss Flood came there was no one in the museum to deal with the great accumulations of that kind, and she threw herself into the work with unbounded energy and zeal. When Mr. Nichols mentioned

the Farnham collection of minerals she begged to be allowed to make another search for rare minerals among the dust-covered cases containing the remainder of the collection. She found a good number and added them to those already exhibited. Nothing was too irksome for her, and she simply revelled in work. She was anxious to study and, if possible, master some really difficult group of animals ; and when I recommended to her the Tunicates, which had repelled almost all zoologists by their unattractiveness, she beamed with delight and at once carried off the literature on the subject to study it at home. I am sure she would have succeeded in thoroughly mastering that puzzling group of marine animals, for she would not shrink from any difficulties. It was delightful to meet a congenial spirit endowed with such fervour and eagerness to learn, and with whom all work was a labour of love."

Miss Flood was a member of the Dublin Naturalists' Field Club, and some of the members recollect the charming paper on the life in the pools by the seashore at Skerries, which she read at one of the meetings last winter.

A. HENRY.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

APRIL 13.—The Club met at Leinster House, the President (H. A. LAFFERTY) in the chair.

Prof. G. H. CARPENTER showed stages in the development of a snowy fly (*Aleyrodes* sp.) and exhibited also the larva of the Vine Coccid (*Pulvinaria vitis*) from a Co. Dublin greenhouse, for comparison with the *Aleyrodes* larva.

D. MCARDLE showed *Plagiochila punctata*, one of the rare foliose Hepaticae. The interesting feature is the cell structure, the lumen of the cells being quite clear with thick walls and angles of a brown colour which give the leaves a punctate or dotted appearance, hence the name. The leaves are roundish-oval in shape with the upper margin recurved spinose ciliate, the lower margin is quite entire. The specimen exhibited was found at Killarney.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 15.—The President (S. A. BENNETT, B.A.) in the chair. Canon W. P. CARMODY lectured on "Lisburn in the Olden Days," tracing the town's history from the early seventeenth century. The President, J. S. Killen, R. S. Lepper, M.A., and the Secretary took part in the subsequent discussion.

REVIEWS.

THE ANTLERS OF DEER.

The Growth and Shedding of the Antler of the Deer. The Histological Phenomena and their Relation to the Growth of Bone. By SIR WILLIAM MACEWEN, F.R.S. Glasgow: MacLehose, Jackson and Co. 1920. Pp. xviii. and 110. 109 photograph figures. Price 10s. 6d. net.

This monograph contains a detailed account of the author's observations of the processes attending the growth and shedding of the antlers in the Cervidae. The observations have an important bearing upon the general question of the growth of bone, and tend to support the author's recently published work.¹

The antlers of stags are among the most remarkable of the structures known as secondary sexual characters, being found, as is well known, only in the male (except in the Reindeer). The antler arises from a base or pedicle which persists from year to year. At the commencement of growth, this pedicle becomes very highly vascular, and a cap of cartilage is formed on its extremity. This cap commences to ossify rapidly and continues to reproduce cartilage distally as its proximal region is converted into bone—a process analogous to the primary diaphyseal ossification of a mammalian long bone.

Both antler and "velvet" are highly vascular, and the shedding of the antler is a result of withdrawal of the blood supply. This becomes effected in the velvet by compression of the vessels through proliferation of bone at the base of the antler forming a corona which stretches and may break the skin. The dead velvet is rubbed off, leaving the bone naked. The same proliferation of osseous tissue compresses and occludes the nutrient vessels of the bony antler, and it too becomes a dead structure. Resorption of bone at the base of the antler takes place *pari passu* and a layer of granulation tissue is laid down between the antler and the pedicle. At this "absciss layer" separation of the antler eventually

¹ W. MACEWEN, "Growth of Bone," Glasgow, 1912.

takes place. The top of the pedicle has now become very hard and non-vascular, and the skin overgrows it.

The surprising rapidity of growth of the antler is a very remarkable feature. In some of the larger species, according to Flower, antlers may be produced which weigh more than all the rest of the skeleton, and yet the actual period of growth is only about three months. The author has observed nuclear budding to take place in the osteoblasts of the growing antler, in addition to the ordinary mitotic division, and suggests that this occurrence may account for the great augmentation in the rate of growth of the bone. There is a correspondingly rapid growth of the "velvet" to keep pace with the growing bone. The velvet is a highly vascular structure, arising by proliferation of the cells of the skin around the pedicle, and completely covering the bony antler as a true living skin with glands, hair-follicles and hairs.

A detailed account is given of the histological phenomena accompanying the processes of growth and shedding. The osteoblasts are described as arising in an undifferentiated mesodermal syncytium, not from a preformed connective-tissue or periosteal layer, as usually held. A similar origin has been observed by the author in human and other bones, and this view seems to be on a much more satisfactory basis than the theory of periosteal or connective-tissue origin of the osteoblasts.¹ No periosteum appears in the growing antler, the dermis lying immediately over the living bone.

A definite form or type of cell is recognised in the *mature* osteoblast in the antler, and osteoblasts of bone from various other sources are stated to exhibit the same characteristic form. This constitutes an important advance upon the usual opinion that the osteoblast is definable by function only, and not by any special histological character.

An account is given of the methods by which bone is formed by the osteoblasts. The two commonly recognised types of bone-formation—traditionally "intramembranous" and "intracartilaginous"—are described respectively as "direct" and "indirect" methods of ossification. In each case the origin of the osteoblast is apparently the same, but in the latter the development of the mature stage is delayed, and a matrix of cartilage formed. When ossification is about to commence, the osteoblast, which had temporarily assumed the role of "cartilage-cell," develops into the typical mature form, and commences the deposition of bony tissue. The cartilaginous matrix disintegrates, and the ground substance of bone, ossein, takes its place. Calcium salts are deposited, and the characteristic trabecular formation of growing "cartilage-bone" appears. In the direct method of ossification, the osteoblasts early attain their typical form, and at once commence the deposition of bone. Both methods are in operation simultaneously in the antler, but the indirect method predominates. These facts all tend to support the view that the periosteum is not a bone-forming organ, as generally stated, but

¹ Cf. Rendle Short: "The New Physiology." 1920. Chap. vii.

is merely of trophic function and probably also acts as a limiting membrane confining the osteoblasts to their proper sphere.

Other interesting matters are referred to, such as the deformities and malformations of the antler due to injury or disease, the effects of castration, etc., which add to the value of the work. The book is copiously illustrated with excellent photographs, and the printing and binding are exceptionally good. A few obvious misprints occur, the most common being the use of "phenomena" for "phenomenon," and one or two misspellings of "syncytium." The generic names, on pp. ix., xvi., and 59 among other places, would look better in capitals, which are correctly adopted in other parts of the book for this purpose. Altogether the book is a valuable and suggestive contribution to both zoological and histological literature.

D. S. TORRENS.

FOR LOCAL NATURALISTS.

Faunistic Survey of Glamorgan. Instructions to Collectors. Cardiff Naturalists' Society. 1920. Pp. 36. 6d. net.

This useful pamphlet has been compiled by Dr. Jas J. Simpson, the Secretary and Recorder of the publishing Society, with the help of various specialists. It gives in brief form much of the information on zoological collecting contained in various pamphlets on special groups issued by the British Museum (Natural History). The immediate object is research into the county fauna, and incidentally the enrichment of the local collections in the National Museum of Wales at Cardiff. The instructions for collecting specimens of various groups are clear and trustworthy, and stress is wisely laid on the need of labelling with accurate notes as to locality, habit at, and date of capture. The public spirit of the Cardiff Naturalists' Society is shown by the offer to supply copies of the pamphlet at 6d. each to other societies, and we heartily commend this generous action of our Welsh colleagues to the consideration of Irish naturalists.

PLANT LORE FOR THE YOUNG.

A Book about Plants and Trees: a simple guide to Natural Study for Boy Scouts and Girl Guides. By R. and S. G. GURNEY. 8vo. Pp. xiv., 103. C. Arthur Pearson, Ltd. 1920. 1s. 6d. net.

This little book is designed to assist boys and girls to obtain the "Naturalists' Badge" in the scout fraternity. It consists of short chapters very simply written, introducing the juvenile reader to the whole range of naked-eye botany. It is field botany without a lens and without Latin names, and gives as good an introduction to the subject as these severe restrictions allow. A proper breadth of view is main-

tained throughout. Occasionally the authors seem to betray an absence of personal knowledge with the plants they deal with, as when they describe the Horned Poppy as an annual. And their very simple language sometimes verges on the inaccurate, as when they speak of the "flower" (*i.e.*, inflorescence) of the Arum and Yarrow, and write of the Oak: "The female flower grows into a hard cup in which the acorn is seated," or of the Primrose: "In the middle of the flower at the bottom is a little round thing called the ovary, with a rod sticking up from it and ending in a round knob. This rod is called the pistil, and the ovary and the pistil are the female organs of the flower."

R. LI. P.

NOTES.

ZOOLOGY.

Physalia on the Co. Derry Coast.

Dr. Scharff's interesting paper (*ante*, pp. 29-30) on the occurrence of Turtles on the Irish coast reminds me that I met with a specimen of the "Portuguese Man-of-War" at Castlerock, Co. Derry, in August, 1881. It had been washed up on the strand and was a very conspicuous object. At the same time and place I found a great number of Ianthina. They were there in dozens on the sand. I have found it also at Portnoo, but very sparingly. Velella I have met with at Castlerock, Portnoo and Coolmore. Last July at Portnoo there were great numbers of them on the sandy shore and many were alive and showing the beautiful blue colour

W. F. JOHNSON.

Poyntzpass.

Whales and Dolphins stranded on the Irish Coast during 1919 and 1920.

Reference was made in the *Irish Naturalist* of Nov.-Dec., 1919, to Dr. Harmer's Report on the Cetacea stranded on the British coasts during the year 1918. The distinguished author, who has since had the honour of becoming Sir Sidney Harmer, has just published a Report¹ on the same subject for the years 1919 and 1920.

The Irish records for these years are unfortunately very few in number, which is attributed by the author to the disturbed state of Ireland. In fact, he has heard of only four occurrences, whereas there must have been far more.

¹ Sir S. F. Harmer: "Report on the Cetacea stranded on the British coasts during 1919 and 1920. London; 1921. British Museum.

The four records belong to the following species :—

LESSER RORQUAL (*Balaenoptera acutorostrata*)—Broadhaven, Co. Mayo, January 7th, 1919, 15ft. long.

CUVIER'S WHALE ? (*Ziphius cavirostris*)—Gweebarra Bay, Co. Donegal, July 3rd, 1919, 18ft. long. The body of this animal was in a putrid condition and had been badly damaged, but from a sketch made by the coastguard of Portnoo, Narin, Sir Sidney Harmer was of opinion that the specimen may have been a female or young male Cuvier's Whale. The identification was necessarily doubtful.

DOLPHIN (*Delphinus delphis*)—Youghal, Co. Cork, August 4th, 1919, 8ft. 6in. long.

PORPOISE (*Phocaena communis*)—Dungarvan, Co. Waterford, Nov. 15th, 1919.

No particulars seem to have been furnished as to the length of the specimen.

While the Whale fisheries on the Irish coasts have been suspended they seem still to be carried on in Scotland, and Sir Sidney Harmer reports that at the Bunaresseader Whaling Station in 1920 there were captured 1 Atlantic Right Whale, 135 Common Rorquals, 30 Blue Whales, 31 Rudolphi's Rorqual and 1 Humpback Whale.

BOTANY.

Ranunculus Auricomus and Chelidonium majus in Co. Wexford.

I am glad to be able to add the Goldilocks to the flora of Co. Wexford, where it seems hitherto to have escaped discovery. During a recent visit to my sister at Mount Forest I found it growing in several spots about Ballycanew, on the Owenavorragh river. This district, though within a few miles of Gorey and of Courtown Harbour, appears to have been but little explored. Its flora, during three visits within the past 12 months, struck me as singularly meagre, and among the plants I totally failed to find I may specially mention *Scrophularia aquatica*, which in other parts of Wexford seems scarcely less common (if not more so) than *S. nodosa*. Two local species observed near Ballycanew were *Bidens tripartita* and *Epipactis latifolia*.

As Wexford is one of the few counties for which the Greater Celandine apparently wants a record, I may mention having noticed it by a roadside not far from Camolin, between that town and the village of Ballyoughter. The inevitable farmhouse also occurs, but the plant seems well established.

C. B. MOFFAT.

Dublin.

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THE METEORITE OF CRUMLIN, CO. ANTRIM,
1902.

BY GRENVILLE A. J. COLE, F.R.S.

THE death of Sir Lazarus Fletcher, F.R.S., on 6th January, 1921, has removed one of the most kindly and stimulating, as well as one of the most eminent, of scientific workers in our islands. He left behind him the MS. of a description of the meteorite that fell visibly at Crosshill, near Crumlin in the county of Antrim, on 13th September, 1902, and this has now been published in the *Mineralogical Magazine* (Vol. xix., June, 1921, p. 149).¹ The news of the fall spread somewhat slowly, the first notices being in the form of unsigned paragraphs in the Belfast *Evening Telegraph* of 16th September, and the *Northern Whig* of the following day. Sir L. Fletcher properly gives to Mr. W. H. Milligan, of Belfast, the credit for being the first to examine the occurrence from a scientific point of view. A small personal note may perhaps here be allowed, lest it should be thought that no effort was made to secure the stone for Ireland. I was already on my way to Scotland when one of the newspaper paragraphs caught my eye. I wrote at once to the owner of the meteorite and to the authorities at our National Museum. Unfortunately the replies were addressed to me, not to Inverness, but to Inverary, where, as unclaimed correspondence, they waited their due postal month. Meanwhile, Fletcher had established communications, and on 26th September he descended, with the energy of a Viking, on the Irish coast. Paying a considerable sum by his personal cheque, he returned the same evening with his prize to England. A handsomely coloured model of the stone was subsequently presented to the National Museum in Dublin by the Trustees of the British Museum, and perhaps we ought not to regret that the central

¹ Naturalists may like to know that No. 93 of the *Mineralogical Magazine*, containing this long-delayed scientific description, can be obtained from Messrs. Simpkin, Marshall & Co., 31 Paternoster Row, London, E.C.4, price 5s.

institution was able to add so interesting a specimen to the finest collection of meteorites in the world. Meteorites, after all, have no country, and Fletcher's investigation now adds dignity to that received from outer space at Crumlin.

By a characteristically friendly arrangement, Fletcher intended to present his paper to the Royal Irish Academy, and would have come over himself to read it. Year after year, when I visited him in the Natural History Museum at South Kensington, he would open the drawer containing his manuscript and specimens, and regret that his many official duties rendered the research still incomplete. His promotion to the Directorship of the Museum in 1910 established many further claims, and the work remained unfinished at his death. Dr. G. T. Prior, who succeeded him as Keeper of the Mineral Collections, has now added a chemical analysis and a microscopic investigation. He determines the stone as "a grey hypersthene-(to bronzite)-chondrite, containing about 9 per cent. of nickel-iron, in which the ratio of iron to nickel is about 7." That is, the iron by weight is about seven times as much as the nickel. The chondrite type of meteorite, it may be remembered, takes its name from the globular aggregates of silicates known as "chondrules." The nickel-iron, forming in this case nearly 9 per cent. by weight of the stone, occurs in these "sporadosiderites" of Daubrée as scattered blebs throughout a silicate ground, which, like the chondrules, consists mainly of pyroxene and olivine. Good photographs are given of two aspects of the stone.

Fletcher's admirable summary of the accounts of eye-witnesses of the fall is accompanied by a map. W. H. Milligan's careful and prompt enquiries failed to elicit evidence of any other falls, though, from his investigation of the sound records, he believes that the meteorite "entered the denser strata of the atmosphere apparently at a high angle over the centre of Co. Down."

The weight of the portion seen to fall, and dug up from the cornfield at Crosshill, is 4,329 grammes (nearly $9\frac{1}{2}$ lbs.).

THE TIME OF THE SINGING OF BIRDS.

BY D. C. CAMPBELL.

MR. BURKITT'S interesting article on "Songs and the Nesting of Birds," in the *Irish Naturalist* for January (p. 1 *supra*), brings up many points for investigation. But the questions he raises are, I feel, beset by many difficulties.

For example, how is it possible to recognize and keep under observation individual birds unless they are captured and marked; also how can one be *sure* that certain singing birds are nesting or not? As to the question of mating and nesting putting a stopper on song, I always leant to the common belief that the fullest and most persistent singing was during the breeding season. Mr. Burkitt's careful observations throw doubt on this. Still I am inclined to think that some of our Irish birds—like the case of American Warblers quoted by Mr. W. H. Workman in the April number (p. 52)—sing over or near their nests. Without being positive, I would mention the Thrush, Robin, Chaffinch and Hedge-Sparrow. I have definitely noted the Goldcrest and Blackbird singing above their nests.

If mating and nesting put a stopper on song, we should find a falling off in song, but in my experience this is not so, in fact the reverse is true, March, April and May bring out the fullest volume of song; this is not to say that by any means all the singing birds are nesting, probably a fair number are not. It would not be easy to estimate the number of nests and the number of singing birds in a given area, but I think it could be done.

I have looked up my books, and the following lists give details of my notes on the singing periods of some of our common species. The observations were mostly made during morning journeys of about three miles to town, along a varied country road. My notes on other species are not sufficiently complete to embody in the lists.

The beginning and ending of the song periods approximately agree with Mr. Burkitt's records, also with Mr. Foster's monthly records in the *Irish Naturalist* for February (p. 21 *supra*).

The dates in the first three months are days I noted the commencement of the song.

The figures are the number of days in each month when I heard the bird singing.

1893.

	January.	February.	March.	April.	May.	June
Missel Thrush ..	22nd, 3	6	12	18	5	—
Song Thrush ..	12th, 6	24*	21	14	23	26
Blackbird ..	—	—	2nd, 10	21	29	22
Hedge-sparrow ..	—	3rd, 16	20	15	14	12
Chiffchaff ..	—	—	30th & 31st.	17	16	17
Willow Wren ..	—	—	—	3rd, 21	27	21
Robin ..	6th, 23	27	27	30	29	18
Wren ..	22nd, 7	19	25	30	30	27
Great Tit ..	11th, 7	10	9	18	7	2
Blue Tit ..	15th, 8	13	11	13	15	16
Coal Tit ..	—	8th, 3	6	11	2	5
Chaffinch ..	27th, 29th & 30th.	22	24	25	25	14
Greenfinch ..	—	5th, 19th & 23rd.	11	16	8	6
Yellowhammer ..	—	21st, 23rd & 23rd.	16	19	14	13
Com. Bunting ..	—	12th	1	5	2	1

1893.

	July.	August.	Sept.	October.	Novr.	Dec.
Missel Thrush ..	—	—	—	—	—	—
Song Thrush ..	4	—	—	—	1	9
Blackbird ..	—	—	—	—	—	—
Hedge-sparrow ..	4	2	—	—	—	—
Chiffchaff ..	7	2	—	—	—	—
Willow Wren ..	—	—	—	—	—	—
Robin ..	4	25	27	24	16	17
Wren ..	21	24	21	23	15	16
Great Tit ..	1	—	2	—	—	—
Blue Tit ..	1	5	—	7	—	—
Coal Tit ..	1	—	—	—	—	—
Chaffinch ..	—	—	2	—	—	—
Greenfinch ..	7	2	—	—	—	—
Yellowhammer ..	20	17	1	—	—	—
Com. Bunting ..	3	—	—	—	—	—

BEGINNING AND ENDING OF SONG.

1894.

Missel Thrush	..	16th January	..	20th May
Song Thrush	..	1st January	..	22nd July
Blackbird	..	17th February	..	25th June
Hedge-sparrow	..	12th February	..	30th July
Chiffchaff	..	25th March	..	19th July
Willow Wren	..	8th April	..	15th July
Robin	..	1st January	..	to December
Wren	..	2nd January	..	to December
Great Tit	..	17th January	..	early July
Blue Tit	..	17th January	..	14th June
Coal Tit	..	7th February	..	16th July
Chaffinch	..	2nd February	..	14th June
Greenfinch	..	1st April	..	19th July
Yellowhammer	..	14th March	..	21st August
Common Bunting	..	1st April	..	2nd September

1895.

Missel Thrush	..	10th January	..	23rd May.
Song Thrush	..	4th January	..	22nd July, also in December.
Blackbird	..	4th March	..	5th, 10th & 18th July.
Hedge-sparrow	..	21st February	..	3rd August
Chiffchaff	..	6th April	..	18th July, also 26th August.
Willow Wren	..	16th April	..	12th July
Robin	..	4th January	..	to December
Wren	..	4th January	..	to December
Great Tit	..	7th January	..	end June
Blue Tit	..	31st January	..	1st June
Coal Tit	..	31st January	..	do.
Chaffinch	..	1st February	..	16th June
Greenfinch	..	4th March	..	21st July
Yellowhammer	..	25th March	..	28th August
Common Bunting	..	2nd April	..	19th August also in December.

Londonderry.

NOTES.

GEOLOGY.

The Adare Meteorite.

A shower of meteoric stones, the largest of which weighed 65 lbs. (29.5 kg.) fell near Adare, Co. Limerick, on September 10th, 1813. Two samples are in the museum of Trinity College, Dublin (V. Ball, *Journ. R. Geol. Soc. Ireland*, vol. vi., p. 160, 1882), and there is one, weighing 134.9 grammes, in the National Museum. Dr. James Apjohn, in 1839, published an elaborate account of the material from a chemical point of view ("Analysis of a meteoric stone which fell near Adair, on September 10th, 1813," *Trans. R. Irish Acad.*, vol. xviii., p. 17). In addition to the iron and nickel, he detected chromium and a little cobalt, and "a trace of oxide of manganese" in the part undissolved in hydrochloric acid. From his final results (p. 29) he concluded, acutely enough, that the matrix of the stone consisted of a unisilicate, in which one atom of olivine was united with one atom of pyroxene. In 1874, Richard Apjohn, M.A., T.C.D., Praelector of Chemistry, Caius College, Cambridge, investigated one of the specimens in Trinity College, Dublin, in connexion with his researches on the occurrence of vanadium ("On the analysis of a meteoric stone and the detection of vanadium in it," *Journ. Chem. Soc.*, New Series, vol. xii., p. 104). He seems, curiously enough, to have been unaware of James Apjohn's publication thirty-five years before, though the veteran chemist was still living. V. Ball, on the other hand (*op. cit.*, p. 159), ignores Richard Apjohn's paper. R. Apjohn gives the iron to nickel proportion as 85.120 to 14.275 per cent., that is, 6 : 1. He finds 6.26 per cent. of manganese oxide in the portion of the meteorite soluble in hydrochloric acid, and 8.84 in the insoluble portion. Dr. G. T. Prior, F.R.S. (*Min. Mag.*, vol. xviii., p. 33, 1916), on the basis of R. Apjohn's figures, found the Adare stone to be somewhat anomalous among chondrites, (which are the typical stony meteorites with diffused blebs of nickel-iron). He was inclined to question the uniform distribution in it of so high a percentage (19.07) of nickel-iron, and thought that its richness in nickel allied it to his Baroti group. He has now, however (*Min. Mag.*, vol. xix., p. 167, 1921), analysed a fragment in the collection of the British Museum. He shows that the large percentage of manganese determined by R. Apjohn should probably be referred to magnesia. He confirms the high percentage of nickel-iron, but raises the proportion of iron to nickel from 6 to 11. These results seem, then, to place the Adare meteorite within Prior's Cronstad group. He gives the mineral composition, from his detailed analysis, as bronzite 33.83, olivine 32.64, nickel-iron (Fe : Ni = 11) 18.46, felspar (mainly albite) 7.52, troilite 5.60, chromite 0.87, and apatite 0.63 per cent.

G. A. J. COLE.

Royal College of Science, Dublin.

Spiranthes Romanzoffiana in County Kerry.

Miss M. C. Knowles, of the National Museum has quite recently shown me a specimen of the above Orchid gathered in Kerry by Mr. P. MacSweeney on the 30th July, 1916; it is a welcome and long-expected addition to the county flora. In reply to enquiries by the present writer, Mr. MacSweeney states that he found the plant growing sparingly in a bog near Waterville; not more than 4 or 5 specimens were seen.

As the distribution of this North American *Spiranthes* makes it one of the most interesting plants in the British flora, a short note on its present known range may be of interest. It was first found in 1810 by J. Drummond in a rushy meadow at Castletown-Berehaven, in Co. Cork, which locality remained for over sixty years its only known station in Europe. In 1873 and 1874 two mere Co. Cork localities were added, both of these being inland. In 1892 it was discovered in Co. Armagh, and it has subsequently been recorded from several other northern counties around Lough Neagh, occurring in some of these latter stations in great abundance. It is still, however, unknown in Europe, outside of Ireland. Elsewhere it occurs in British North America, the northern United States and Kamtschatka.

Whether the southern and northern plants should both be referred to *Spiranthes Romanzoffiana* is open to doubt. The respective plants differ in their appearance as well as in their manner of growth. Even allowing for the gap of well over 200 miles that separates the Cork and Kerry stations from those around Lough Neagh, their changed climatic conditions do not fully account for the differences seen. It is most desirable that a careful examination of fresh plants from both areas should be carried out.

R. W. SCULLY.

Dundrum, Co. Dublin.

Cnicus pratensis in Co. Dublin.

While exploring Glenasmole for orchids at the end of May, I was surprised to find quite a large station for the very local *Cnicus pratensis*, about 300 yards south of St. Anne's churchyard, and about the same level. The plant is scattered over about an acre of a swampy meadow, in patches three or four yards across, and shows bud and blossom in abundance. This species appears to have been missing from the Co. Dublin flora since 1833, and does not seem to have been previously recorded from Mr Colgan's Dist. 7.

J. P. BRUNKER.

Dublin.

The Mountain Pansy and its Time of Flowering.

On May 18th Mr. Athole Harrison brought me some fine flowers of *Viola lutea*, which he had noticed in profuse bloom near Brittas a few days previously. The locality—a little east of Brittas tramway station—is not one of the seven that are noted for the plant in Mr. Colgan's "Flora of County Dublin," though falling well within its known ambit in the southern part of Districts 6 and 7; and it seems probable that further research at the right time of the year might reveal the existence of a considerable number of additional stations. I remember many years ago seeing a single plant of this species on Kilmashogue Mountain, in Mr. Colgan's District 8, but this may have been from an accidentally dropped seed.

On looking up the plant's distribution, both Mr. Harrison and myself were rather taken aback at finding its season of flowering set down as June and July. Babington's Manual (latest edition), both editions of "Cybele Hibernica," and the "Flora of County Dublin," are unanimous on this point. Bentham and Hooker's "Handbook" escapes the subject by treating the species as a mere variety of *Viola tricolor*. As Mr. Harrison's plants were in full and copious bloom by the middle of May, I thought it best to take the blossoms to Mr. Praeger for inspection before feeling sure that our identification was correct. Mr. Praeger, however, not only confirms the species, but seems to regard May as quite a usual month for finding it in flower. If so, the leading text-books want a little correction on this important subject, and it is one that Dublin botanists have special opportunities for elucidating. Not only the time of coming into flower, but the length of continuance of the flowering season, should be carefully noted for several years. So beautiful a plant will well repay closer study than it seems yet to have received.

C. B. MOFFAT.

Dublin.

Antrim Plants.

In the course of a few days spent at Carnlough, at the end of May, a few interesting plants were seen, in spite of the early date and late spring. *Sanguisorba officinalis* was seen in what is evidently close to 'Adams' station (I.N., 1899, 57) "very abundantly in a meadow at Ardclinis, about a mile north of Carnlough," namely, rough banks by the coast road at Bottle Point, extending for about a quarter of a mile, growing among gorse. *Galium sylvestre* was found in Cushenill Glen (where *Meconopsis cambrica* is still abundant), and also (with *Plantago maritima*) at 800 feet on the cliffs above the larch plantation south-east of Callisnagh Bridge in Glenariff, where a pair of Peregrines were breeding; by the old mineral railway at the same place *Equisetum umbrosum* grew. A good clump of Parsley Fern was seen at the base of a dry-built wall at 900 feet by the

Pollan Burn, with a tuft of Beech Fern within a foot of it. On the top of the plateau conditions were still very wintry, but *Carex irrigua* was seen in its station near Cranny Lough, only about two inches high but already past flowering. *C. pauciflora*, on the other hand, showed as yet no trace of flower, but could be distinguished by its very slender yellowish filiform leaves, two or three on a stem. With them at Cranny Lough a single fine plant of *Listera cordata* was already in full flower, growing in soaking Sphagnum. *Lobelia Dortmanna* and *Isoetes lacustris* are still abundant in Craigfad Lough. *Crepis biennis* is very common, and *Ophioglossum vulgatum* frequent, about Carnlough.

R. LLOYD PRAEGER.

Dublin.

Mosses and Hepaticae of Sligo and Leitrim.

The Musci and Hepaticae enumerated below may be of interest. New v.c. records are indicated by an asterisk. *Swartzia montana* Lindb.—Knocknarea, v.c. 28, 1920. **Campylopus subulatus* Schp.—Knocknarea, v.c. 28, 1920. *Weissia verticillata* Brid. (*Mollia verticillata* (L.) Ldbg).—Wet shaley rocks, Cregg Connell, v.c. 28, 1920. *Trichostomum mutabile* Bruch. (*Mollia brachydontia* (Bruch) Ldbg. Wall.—Lakeside, Lough Gill, v.c. 28, 1920. *Philonotis calcarea* Schp.—Knocknarea, v.c. 28, 1920. **Mnium rostratum* Schrd.—Dunes, Resses Point, v.c. 28, 1920. *Pterygophyllum lucens* Brid.—Ben Bulben and Knocknarea Glen, v.c. 28, 1920. Abhain Buidhe near Kilmoney Abbey, v.c. 4, 1919. *Brachythecium salebrosum* B. and S. (*Hypnum plumosum* Huds.) v.* *palustre* Schp.).—Abhain Buidhe near Kilmoney Abbey, v.c. 4, 1919. **Eurynchium Teesdalei* Milde. (*Hypnum Teesdalei* Sm.).—Knocknarea, v.c. 28, 1920. *Plagiothecium elegans* Schp. (*Isopterygium elegans* (Hook) Ldbg.).—Abhain Buidhe, Ballygarvan, v.c. 4, 1919. *Hypnum commutatum* Hedw. (*Amblystegium glaucum* (Lam) Ldbg.).—Cregg Connell, v.c. 28, 1920. *Webera carnea* Schp. (*Pohlia carnea* (L.) Ldbg.).—Under overhanging gravel, near Crosshaven, v.c. 4, 1919. *Reboulia hemisphaerica* (L.) Raddi.—Lahanagh and Drumcliffe Strand, v.c. 28, 1920. *Aneura pinguis* (L.) Dum.—Knocknarea, v.c. 28, 1920. *Metzgeria furcata* (L.) Dum.—Peat bog, Tormore, v.c. 28, 1920. *Plagiochila asplenoides* (L.) Dum.—Doonally, v.c. 28, 1920. Var. *major*, Nees.—Near Lough Gill, v.c. 28, 1920.

WILLIAM A. LEE.

Rock Ferry, Cheshire.

ZOOLOGY.**Records of Irish Birds.**

In his "Notes on some Irish Birds" in the May number of the *Irish Naturalist* (p. 64 *supra*), Mr. A. Harrison says that "Ravens are very rarely observed in the Co. Wicklow." That is not my experience; they are frequently seen about the Upper Lake, Glendalough, where they build; also at Lough Nahanagan, close to Glendalough.

W.M. H. HINDE.

Selston, Greystones.

In the May issue of the *Irish Naturalist* Mr. A. Harrison's "Notes on some Irish Birds" are, in my opinion, open to doubt. He evidently saw 100 Sanderling or Knots on the North Bull on March 13th. Phalaropes, when they do visit us, usually arrive singly or in pairs. The Yellow Wagtail I have never seen near a town or street, it is always in the open country. On such a date, Feb. 20th, it could not be anything but a Grey Wagtail, a species which is quite common in the city. Ravens, instead of being "rarely" seen in Wicklow, breed there regularly, and have done so for years, at Luggala, Glendalough and Powerscourt. With regard to Mr. G. C. May's record of Serins in Queen's Co., no date is given when the two pairs were seen. In all probability Lord Castletown saw two pairs of Siskins, which closely resemble the very rare Serin.

W. J. WILLIAMS.

Rathgar, Dublin.

Lesser Whitethroat in Co. Dublin.

I send the following description of a bird which I saw here this morning, and heard singing several times since June 1st. I have identified it as the Lesser Whitethroat, but I would like an opinion following on my description, which is as follows:—

Length, about 5 or $5\frac{1}{4}$ inches. Upper parts dull brown; breast grayish; throat white or nearly so; head brown, with darker brown or black round the lores; legs and feet appear greenish grey.

Habits and behaviour.—Heard singing in garden shrubs bordering a grass walk near the Club. Shy of observation; flight rather feeble, and with very marked wing "beats"; occasionally took a short flight, in a manner resembling a Lark, but only for a few feet up, and then returned to the branch of a small birch tree; this was done twice, the bird singing all the time, which it did with energy, and the feathers of the head erected,

so as to almost form a crest. Sat very closely, but always contrived to be more or less hidden from the observer, and when approached more closely took wing to another shrub or small tree. Song a repetition of warbling notes, distinct, rather rapid, but not as strong as that of the Blackcap. Alarm note not heard. Only one bird seen.

HELEN M. RAIT KERR.

Carrickmines, Co. Dublin.

The description given accords very closely with that of the Lesser Whitethroat, except as regards the legs, which in that species are distinctly bluish-grey. The habit of continuing its song during an occasional short upward flight has also been noted of this species by Mr. T. A. Coward ("Birds of the British Islands," vol. i., p. 159). The Lesser Whitethroat is as yet only known as a rare straggler to Ireland, and it would be very satisfactory to be able to add it definitely to our list of the birds breeding in this country.

C. B. MOFFAT.

Dublin.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

MAY 4.—EXCURSION TO THE GOBBINS.—Upwards of fifty members visited the Gobbins, a neighbourhood always popular with the Club. At a spot halfway to the Gobbins Head the Conductor (Dr. A. R. Dwerryhouse) gathered the party together and gave an interesting description of the principal geological points of the locality. Fortunately the tide was low, and the members were thus able to trace the Liassic beds (covered at high water), then the Greensand, Chloritic Chalk passing into true Chalk, capped in its turn by basalts, the latter covered by boulder clay. Several characteristic fossils having been obtained, the party moved on to the Gobbins Head, a natural feature which gives such a good example of the flow structure of the basalts.

Rev. W. R. Megaw pointed out *Carex divisa* growing by a roadside in considerable quantity—an addition to the Antrim flora.

At the business meeting held during the excursion eleven new members were elected, this bringing up the total new members elected since the session opened to eighty, a number testifying to the continued healthy growth of the Club.

MAY 21.—EXCURSION TO BELVOIR PARK.—Upwards of 70 members assembled at the Ormeau Road tram terminus at three o'clock for the purpose of exploring Belvoir Park, permission to visit which having been very kindly granted by the Right Hon. Sir James Johnston, P.C., J.P. The park has always been a happy hunting ground for the Club botanists,

and on this occasion it is pleasant to record that all the plants which were known to grow in the demesne were found in flourishing condition. Amongst them may be noted the Water Bitter Cress and the Greater Pond Sedge. Two specimens of the Bird's-nest Orchid were found, and the Adder's-tongue was seen in profusion. The members greatly admired the profuse display of bloom in the rock and water garden.

Tea was served at five o'clock, after which the election of new members was proceeded with.

JUNE 18.—EXCURSION TO ARDGLASS.—The members visited Ardglass and neighbourhood, the route followed first leading round Phennick Point to St. Patrick's Well. On the way the geologists noted many fine examples of vertically-tilted strata of Silurian grits, the rocks running in some places well out to sea, their razor-back edges giving a picture of the terrible nature of this part of the Down coast in times of storm. An interesting cave was also observed, the roof formed of calcreted glacial gravel, resting on very much inclined beds of grit. A halt was made at Ardtole Church. Here the conductor (S. A. Bennett, B.A., B.Sc.) gave an interesting account of the history of the structure and also of its restoration and repair, a work largely due to the initiative and energy of Mr. F. J. Bigger. Here the party was joined by Mr. and Mrs. W. A. Green, who very kindly placed their car at the disposal of the members, taking them in relays to Castle Shane, where Mr. Bigger had very hospitably prepared tea for the party, an attention greatly appreciated.

DUBLIN MICROSCOPICAL CLUB.

JUNE 18.—ANNUAL EXCURSION.—By invitation of the Honorary Secretary, Sir Frederick Moore, the members visited the Royal Botanic Gardens. A party of twenty made their way to Glasnevin, where they were conducted round the various plant-houses and nurseries. The rich and well-kept collections of ferns, palms, orchids and other plants were examined with interest and pleasure. After their walk around the Gardens the members were hospitably entertained to tea by Lady Moore.

NEWS GLEANINGS.

Zoology in Dublin University.

Following on the resignation of Professor H. W. Mackintosh, who has occupied the chair of Zoology and Comparative Anatomy in Trinity College since 1878, the University Council has appointed to the vacant professorship Dr. J. B. Gatenby of Magdalen College, Oxford and University College, London. Dr. Gatenby is well-known to zoologists for a valuable series of memoirs on cell-structure, in which he has studied with minute care the nature and origin of the extra-nuclear inclusions in the germ-cells of animals of various groups. His advent to Dublin will be heartily welcomed by biological workers whether within or outside Trinity College.

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AND

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,, 21.	Diseases of Poultry:—Gapes	,, 73.	The Planting and Management of Hedges.
,, 22.	Basic Slag.	,, 74.	Some Common Parasites of the Sheep.
,, 23.	Dishorning Calves.	,, 75.	Barley Sowing
,, 24.	Care and Treatment of Premium Bulls	,, 76.	American Gooseberry Mildew.
,, 25.	Fowl Cholera.	,, 77.	Scour and Wasting in Young Cattle.
,, 26.	Winter Fattening of Cattle.	,, 78.	Home Buttermaking.
,, 27.	Breeding and Feeding of Pigs	,, 79.	The Cultivation of Small Fruits
,, 28.	Blackleg, Black Quarter, or Blue Quarter	,, 80.	Catch Crops.
,, 29.	Flax Seed	,, 81.	Potato Culture on Small Farms
,, 30.	Poultry Parasites—Fleas, Mites, and Lice.	,, 82.	Cultivation of Main Crop Potatoes
,, 31.	Winter Egg Production.	,, 83.	Cultivation of Osiers.
,, 32.	Rearing and Fattening of Turkeys	,, 84.	Ensilage.
,, 33.	Profitable Breeds of Poultry.	,, 85.	Some Injurious Orchard Insects.
,, 34.	<i>Out of Print.</i>	,, 86.	Dirty Milk.
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,, 39.	” Mangels.	,, 91.	Black Scal in Potatoes
,, 40.	” Oats.	,, 92.	Home Preservation of Eggs.
,, 41.	” Turnips	,, 93.	Marketing of Wild Fruits.
,, 42.	Permanent Pasture Grasses	,, 94.	<i>Out of Print.</i>
,, 43.	The Rearing and Management of Chickens	,, 95.	Store Cattle or Butter, Bacon, and Eggs.
,, 44.	"Husk" or "Hoose" in Calves	,, 96.	Packing Eggs for Hatching
,, 45.	Ringworm on Cattle	,, 97.	Weeds.
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,, 50.	Portable Poultry Houses.		
,, 51.	The Leather-Jacket Grub.		
,, 52.	Flax Growing Experiments.		

SPECIAL LEAFLETS.

- 8. Destruction of Farm Pests.
- 12. Digging and Storing of Potatoes.
- 18. Treatment of Allotments for the Growing of Vegetables.
- 19. Home Curing of Bacon.
- 21. Farmers and Income Tax.
- 23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

THE POST-GLACIAL CLIMATIC OPTIMUM IN IRELAND.

BY J. DE W. HINCH.

WHEN it was decided to arrange the palaeontological collections of the Geological Survey of Ireland on more modern museum lines, the Estuarine Clays of the north-east of Ireland were among the first sections to be dealt with. Apart from the decision to give them a more definite representation in the succession of the geological deposits of Ireland, a representation to which they are undoubtedly entitled in the opinion of every geologist who has seriously studied them, it was thought desirable to bring out as clearly as possible the fact that the present distribution of the marine mollusca contained in the clays, points to a warmer climate at the time of their formation, than that existing in the same locality at the present day. The present paper is a preliminary and tentative effort in this direction.

The shells from the Estuarine Clays have long been famous among conchologists on account of the very perfect condition in which they are found ; the material in which they are buried, a fine tenacious clay, having preserved the colour, glaze and sculpturing to such an extent that it is often almost impossible to distinguish many of the Estuarine Clay fossils from modern specimens collected on the sea-shore. These Estuarine Clays have been studied from time to time by conchologists, among others by Grainger, Thompson, Hyndman and Stewart, and more especially by Stewart, but the most definite contribution made regarding their geological importance occurs in two papers, written in 1892¹ and 1896² by R. Ll. Praeger, better known to the scientific world as a botanist, the author of " Irish Topographical Botany " than as a geologist.

¹R. Ll. Praeger : The Estuarine Clays of N.E. of Ireland, *Proc. Roy. Irish Acad.*, Series 3, vol. ii, 1891-3.

²R. Ll. Praeger : The Raised Beaches of N.E. of Ireland, with special reference to their fauna, *Proc. Roy. Irish Acad.*, Ser. 3, vol. iv, 1896-8.

In these communications the writer brings out clearly, that the Estuarine Clays overlie in many places a bed of compressed peat which varies from one to two feet in thickness, that the present day distribution of many of the mollusca found in the Estuarine Clays indicates a warmer sea than that which surrounds the north-eastern coast of Ireland at the present day, and that in the Raised Beaches, which may be regarded as contemporaneous with the later series of the Estuarine Clays, occur large numbers of worked flints of undoubted human origin. This deduction of a warmer sea drawn from the presence of southern mollusca in these beds is the more striking as the writer was not acquainted with Scandinavian work and opinion on the subject, and indeed most of the more detailed investigations on the Climatic Optimum were undertaken after the dates of publication of the papers quoted.

During the publication of these results the author ceased to reside in Ulster and later became specialized in botany and undertook no further research into their contents; and as the opportunities for the study of the deposits are practically dependent on the examination of the excavations made for docks, harbour-works, bridges, etc., very little work has since been done in connection with them. In 1900 a list of the marine mollusca of Ireland was published by A. R. Nichols and from their present day distribution it was possible to draw certain further conclusions regarding the greater warmth, as compared with the present day, of the climate of the Estuarine Clay period. When the Executive Committee of the Geological Congress in 1910 published "Die Veränderungen des Klimas, seit dem Maximum der letzten Eiszeit" no mention was made of these notable contributions, which must be considered a most unfortunate oversight.

This large volume, which was prepared for the Eleventh International Geological Congress held at Stockholm in 1910,

¹A. R. Nichols : A list of the Marine Mollusca of Ireland, *Proc. Roy. Irish Acad.*, Series 3, vol. v, 1898-1900,

contains the results of the studies of European and American botanists and geologists on the post-Glacial fluctuations of climate, and the evidence derived from many divisions of the animal and plant world is there collected and discussed. In the British contribution on the subject the attitude is taken up that the evidence of fluctuation of climate since the close of the Ice Age is so confused and unequal in quality that an explanation may be found in local changes of physiography, and the effect of the strength and directions of the prevailing winds, rather than in a great secular change effecting considerable areas of the world, and that on the whole the post-Glacial deposits have been accumulated during a progressing improvement of climate. The only works mentioned in the British contribution are those of James Geikie and F. J. Lewis on the forest-beds in Scotland and northern England, and as there appears to be considerable difference of opinion as to the value to be assigned to this particular type of evidence, it is a very great pity that the marine mollusca of the Estuarine Clays of the north-east of Ireland were not also mentioned, and the reasonable deductions from the then more northern distribution of many southern species, of a post-Glacial improvement of climate, discussed. It will be desirable now to give in a very general way the results collected by the Executive Committee of the Eleventh Geological Congress regarding the post-Glacial rise in temperature, or, to use the more official phrase, the post-Glacial Climatic Optimum.

In this work the most important investigations and contributions have been made by Scandinavian scientific men, and the predominant position occupied by the geologists and botanists of Norway and Sweden, and to a lesser extent by those of Denmark, in the study of these post-Glacial phenomena is easily explained by a consideration of the geological formation of these countries. In Norway and Sweden especially, the attention of scientific students can only be directed to two considerable geological epochs—the ancient floor formed of Archean and very early Palaeozoic rocks, and the over-lying cover of the Pleistocene series, consisting of boulder-clays, glacial sands, gravels, and silts,

and the post-Glacial peat bogs, lake deposits, marginal marine muds, and the raised beaches. The intensive study of these very late formations has been carried on in Scandinavia in recent years with the result that as regards these beds we are now in a position to formulate a fairly reasonable scheme showing the succession of events since the decay of the great European glaciers of the Ice Age.

A definition of the change of climate included in the phrase "post-Glacial climatic optimum" is desirable and we cannot do better than to accept the one brought forward by Gunnar Andersson, the leading Swedish authority on the subject. His definition is as follows:—"At the end of the late-Glacial period, the warmth increased for a long stretch, so that the temperature of Scandinavia became not only as favourable as now, but even considerably warmer; following on that maximum, the temperature sank again."¹ It will be seen from this definition that we are dealing with one of the later phases of the post-Glacial period and our attention will be mainly directed to the middle and later stages of the Ancylus period, and the early and middle stages of the Littorina period.

The post-Glacial geological history of Scandinavia may be divided into three main periods and to these periods approximate geographical outlines and climates have been ascribed, and while much remains to be investigated in the geographical and climatic conditions of these periods, the following general statement may be taken as a sufficient account of the subject for our present purpose.²

The decay of the latest ice-sheet found the Scandinavian peninsula isolated from the rest of Europe by a sea which stretched across the lower levels of Norway, Sweden, and Russia from the Atlantic Ocean to the White Sea. In the stratified marine deposits of this sea-shells of an arctic type have been found in abundance, and from its most characteristic mollusc, *Portlandia* (= *Yoldia*) *arctica*, it has

¹Gunnar Andersson: Swedish climate in the late-quaternary period, see pp. 247-300, *Die Veränderungen des Klimas*, 1910.

²W. B. Wright: *The Quaternary Ice Age*. London, 1914.

been named the Yoldia Sea. As regards climate all the evidence points to arctic conditions, and the presence of much floating ice.

Towards the end of this Yoldia period a considerable elevation of western Europe set in and portion of the Yoldia Sea was converted into a great fresh-water lake, inhabited by animals and plants requiring a much greater degree of warmth than those which had existed in the preceding Yoldia period, and among which is the small fresh-water mollusc *Ancylus fluviatilis*, from which the name Ancylus Lake is derived. The elevatory movement which converted the Yoldia Sea into Lake Ancylus is considered to have been very extensive and to have effected the area of the British Isles, and probably the coast-line of Europe existed somewhere near the present 100-fathom line. The climate of the period is regarded as a dry, fairly warm, continental or mainland one during which the Fir was the dominant forest tree and during the later part of which the Oak also was found.

At the end of the Ancylus period a considerable depression took place and when the Belt and the Sounds had been submerged the fresh-water Ancylus area was flooded by the warm and salt water of the Atlantic Ocean. The climate of this Littorina period, as it is called from its most characteristic mollusc in the Baltic, is considered to have been a warm damp insular one, with forests of Oak in which the Beech was already making its appearance.

The Climatic Optimum may be considered to have occurred in this period, during the later stages of the Ancylus Age and the earlier stages of the Littorina Age, and it is not easy from the nature of the case to set definite limits to either its commencement or its ending. The land was then occupied to its fullest extent by the animal and plant life now found fossil in the peat-mosses and in the lacustrine deposits, while in the sea the marine fauna flourished in immense numbers and exuberant size. We may consider that the maximum was reached when the Hazel had reached its most northerly fossil boundary, and was not making any further progress as a fruit-producing tree. After a shorter or

longer stationary period a retreat commenced and the plants and animals began to assume their present distribution.

Some of the more important evidence regarding the immigration of southern animals and plants into Scandinavia during the Climatic Optimum may be now referred to. The peat-bogs and mosses of those lands, with their abundant fossil remains of trees, herbs, and animals have long been known as important recent geological deposits and investigations into their fossil contents show definite changes of type as we leave the arctic conditions of the Ice Age and approach the present day.

The high-arctic vegetation of the Yoldia Clays, characterized by *Dryas octopetala* and *Salix polaris*, gradually disappeared and was replaced in certain localities by a sub-arctic flora with *Betula odorata* and *Juniperus communis*. After the ice-sheet had melted, the temperature is considered to have risen rapidly and the plant life having responded to the rise, the flora of the wood-meadows soon replaced the arctic and sub-arctic vegetation. Then came the Birch, Poplar and Fir, the latter becoming the dominant forest tree until the Littorina period, when it began to be replaced by the Oak. This Oak period is considered to coincide in general with the Littorina period and the fact that most of the charcoal found in the kitchen-middens was derived from the Oak enables us to date its maximum distribution at about the time of the Neolithic period. It should be understood that this succession of forest types, Birch, Fir, Oak and Beech is not now considered as important and accurate as a time index as in the earlier studies of the peat-bogs and mosses of Scandinavia, and that while the general succession of Birch, Pine, Oak and Beech in post-Glacial time is a well proved fact, their use as definite evidence of a precise point in post-Glacial time is now regarded as somewhat obsolete. Among the trees and shrubs certain species have been selected for detailed investigation, two of which may be referred to.

The most striking case is that of the Hazel (*Corylus Avellana*) concerning the post-Glacial distribution of which

Gunnar Andersson has dealt with in a detailed monograph. This tree has been found in a fossil condition in 275 localities north of its carefully determined actual northern boundary at the present time, and it is estimated that it has been forced out of a territory of over 84,000 square kilometres since the time of its widest distribution during the Climatic Optimum. A very careful examination of occurrence of the Hazel in relation to the present climate, has led to the conclusions that the period of vegetation during the time of its widest distribution was 2.4° C. warmer than the present day, and that in the Climatic Optimum the autumn was warmer and longer than is the case now. With the Hazel may be placed a number of trees and shrubs which have been likewise pressed back from the northern limit they once reached, and among these may be mentioned the Oak (the characteristic forest tree of the Littorina period), the Linden, the Elm and the Beam-tree, while a very large number of southern species of trees and shrubs now only occur in specially warm and favourable localities; in fact we must regard them generally as relics of a bygone warmer period.

Among the plants of this warmer time may be mentioned the Water-nut (*Trapa natans*) a plant which belongs to the flora of the south of Europe and already rather rare in north Germany. The easily recognised nuts of this plant have been found fossil in Sweden in the peat-bogs as far north as the valley of the Mälaren, and it has been found fossil also in many places in Denmark, West Prussia, Sweden and Finland. In the Swedish flora the Water-nut has only one relic station, in Lake Immeln in north-east Skåne. As in the case of the trees and shrubs there are a large number of plants which only occur in warm and sheltered localities and must be considered as relics of a once wider distribution of the species.

In addition to the forest trees, shrubs and herbs, a number of animals—mammals, insects, fresh-water and land mollusca, also immigrated into Scandinavia during the Climatic Optimum, the most striking instance being the land tortoise *Emys lutaria*, at the present day confined to central and

southern Europe, but found fossil in the post-Glacial deposits of Denmark and Sweden.

From a general review of the evidence of the fossil land and marine plants and animals, we can see that in Scandinavia, in post-Glacial time, there is proof of a warmer period, during which the period of vegetation was much longer than now, and during which the mean temperature was about 2.5° C. higher.

As to the precise time of occurrence in the post-Glacial period of the Climatic Optimum there are some differences of opinion among Scandinavian students on the subject, and to determine the time exactly is a matter of considerable difficulty, for while there is a general agreement that it occurred during the period which would include the late Ancylus stage and the early or middle Littorina stage, Gunnar Andersson is inclined to place it definitely in the late Ancylus stage, while Sernander leans to the Littorina stage. Since, however, Gunnar Andersson admits that the exact date of the flooding of the Ancylus Lake by the warm and salt Atlantic waters is extremely difficult to fix, and that the Climatic Optimum of very late Ancylus Age may reasonably have extended into the Littorina Age, this difference of opinion need not be considered of essential importance, and its main interest for Irish students of post-Glacial fluctuations of climate is that in Scandinavian lands the Climate Optimum took place in late Ancylus-early Littorina times. As the evidence from the Estuarine Clays of north-east Ireland is almost wholly drawn from a fossil, alluvial marine molluscan fauna, it will be necessary to glance more closely at the western Scandinavian deposits of the Littorina Sea. The name Littorina as applied to the marine depression which succeeded the Ancylus Lake is not wholly satisfactory, for while the expressions "Littorina strata" and "Littorina period" may be usefully applied to the Baltic region, these names are not equally satisfactory for the marine alluvial deposits of Denmark, west Sweden and Norway, characterized by the presence of the southerly warmth loving genera *Tapes*, *Dosinia* (*Venus*) and *Ostrea*.

These western Scandinavian marine deposits of the Littorina Sea have been named Tapes beds and divided in two groups. The Older Tapes strata are characterized by the presence of *Tapes decussatus* and *T. aureus*, *Ostrea edulis*, and other species, and are considered to coincide with the period of maximum depression of the land, and also to coincide with the greatest temperature reached in post-Glacial times, the climate during this period being a temperate maritime one with the Oak as the predominant forest tree. The Younger Tapes strata (the Dosinia beds) have *Dosinia (Venus) exoleta*, *Tapes edulis* (= *Tapes virginicus* of Jeffreys), *Lutraria elliptica* and *Psammobia vespertina* as characteristic mollusca and a climate not quite so warm as in the Older Tapes period, and with the Beech becoming predominant in the woodlands.

As regards the position of the Tapes beds in the human history of Europe we can say that the Tapes fauna has been found in the kitchen-middens, a fact which would indicate the general contemporaneity of the Tapes fauna and Neolithic man, while the Younger Tapes or Dosinia beds are considered to have accumulated in the Bronze Age. Another point of interest, and one to which we will return when we come to deal with the Estuarine Clays of Ireland is the great exuberance of the fossil mollusca of the Tapes beds; every writer on the subject pointing out the great abundance and large size of the shells, and this exuberance of life in the Tapes period is the more remarkable when we remember that *Tapes decussatus*, *Tapes aureus*, *Dosinia exoleta*, *Tapes edulis*, *Lutraria elliptica* and *Psammobia vespertina* have since disappeared from Denmark, while the Oyster, one of the most noted of the Tapes fauna for its great size and immense numbers, is now very restricted in its distribution around the Danish coast.

The latest marine deposits to be recognised in Scandinavia are the Mya beds, in which *Mya arenaria* is the dominant species, with the genus *Tapes* only represented by *Tapes pullastra*. The climate was a temperate insular one, with the Beech as the most important woodland tree, and

the archeological date of the Mya deposits may be regarded as occurring in the Iron Age.¹

The general succession of the post-Glacial deposits in north-east of Ireland may be described in descending order as follows :—

Mya beds,	}	Contemporaneous
Raised Beaches		
Thracia (Later) Estuarine Clays		
Scrobicularia (Older) Estuarine Clay,		
Submerged Peat,		
Glacial and late-Glacial sands, gravels and clay,		
Boulder-clays.		

The Boulder-clay and the late-Glacial deposits call for no special comment here. The Submerged Peat is much compressed, and is full of trunks and boughs of Willow, Hazel, Alder and Pine, and contains also the remains of the Wild Boar and Red Deer, and all the evidence points to the vegetation which forms the peat having lived on the spot where it is now found.

The Scrobicularia (Older) Estuarine Clay is a somewhat sandy littoral clay, characterized by the roots and leaves of the Grass-wrack (*Zostera marina*) and containing immense numbers of those mollusca which live between tide-marks. Among these may be mentioned *Mytilus edulis*, *Cardium edule*, *Tapes decussatus*, *Tellina balthica*, *Scrobicularia piperata*, *Hydrobia ulvae*.

The Thracia (Later) Estuarine Clay is a fine tenacious deposit characterized by such Mollusca belonging to the Laminarian or Coralline zone, as *Montacuta bidentata*, *Cardium echinatum*, *Lucinopsis undata*, *Scrobicularia alba*, *Thracia convexa*, *Turritella terebra*.

The Raised Beaches are considered to be contemporaneous with the Thracia or later Estuarine Clay, and in many cases should be regarded as portions of the sea bed which have been deposited on the surface of the Scrobicularia (Older) Estuarine Clays.

¹V. Nordmann : Post-glacial climatic changes in Denmark, see pp.313-328, Die Veränderungen des Klimas, 1910.

V. Nordmann : On remains of Reindeer and Beaver in Denmark, Danmarks geologiske Undersgelse II. Racke, Nr. 28, 1915.

In certain localities the most recent deposit is a blackish clay, with sandy layers characterized by the presence of *Mya arenaria* in beds of thousands.

As this paper is only a tentative effort to elucidate the Climatic Optimum in Ireland, it is not proposed to deal with every available instance in which the present distribution of the mollusca of the Estuarine Clays does not coincide with that of late post-Glacial time. Much still remains to be done in the standardisation of present-day distribution, and it is felt that a general statement is all that is desirable now. The method which has been adopted was to exclude all species which have been classed as rare or rather rare in either the Scrobicularia or Thracia Clays, and only to deal with those which can safely be classed as frequent, abundant or in profusion in these late post-Glacial deposits. In this way we get rid of species based on the occurrence of one or a few specimens, and the mention of which might give an erroneous impression regarding the broad general movement of animal life since that time. Where there is any doubt as to the deposit from which a species has come that particular species has also been excluded. As a result we find that in the Scrobicularia Clay there were present in abundance or in profusion the following five species, *Tapes decussatus*, *Scrobicularia piperata*, *Solen vagina*, *Rissoa albellula*, *Jeffreysia opalina*, and in the Thracia Clay the following eight species, *Lima hians*, *Montacuta bidentata*, *Axinus flexuosus*, *Lucinopsis undata*, *Solen vagina*, *Thracia convexa*, *Odostomia minuta*, *Nassa pygmæa*.

Now a comparison of the present-day habitat of these twelve species, which occur in the Estuarine Clays in abundance or in profusion, shows that a great general change of distribution has taken place since late post-Glacial time. A number of these species are now practically extinct in the older headquarters in the north-east of Ireland, being represented there at present-day only by occasional living specimens, by single valves, or as the result of dredging in considerable depths. The inclusion in present-day distribution of specimens obtained from the Turbot Bank, which is probably a fossil shell deposit, has tended to obscure

the general withdrawal to the south of the species named, but we are now dealing certainly with the partial collapse of a fauna, and the disappearance from a old habitat of many of its most abundant elements, as the result of a change of climate. It has to be borne in mind that the above list of species does not include any of the most striking instances of withdrawal to the south, such as *Gastrochaena dubia*, with its present distribution in Ireland limited between Tramore in Waterford and Roundstone in Connemara; it is a list of animals, which having flourished in immense numbers and exuberance of form in the late post-Glacial seas of north-east Ireland are now represented there only by a depauperated and sparsely distributed remnant. Among the species still inhabiting north-eastern waters, but distinguished for their great size and immense numbers in the Estuarine Clays the examples of the Oyster and of *Turritella terebra* may be recalled. What change of distribution took place as regards the fauna of the Raised Beaches is a much more difficult one as we have not the quantitative evidence available from the Estuarine Clays to build upon, but here also a number of instances are known which support the view of a considerable withdrawal of marine animal life to the southward since late post-Glacial time. It is not proposed, at present, to institute a comparison between the late post-Glacial deposits of Scandinavia and those of Ireland, but the general agreement is obvious, and while we cannot say whether the Estuarine Clay beds were laid down at the time of the Climatic Optimum, or at some later period, we are at least justified in saying that the abundant occurrence of the southern mollusca in these beds may be accepted as proof of a considerable improvement of climate since the Glacial Period, an improvement which has not been maintained, judging by the present-day more southern distribution of many marine animal forms.

NOTES.

ZOOLOGY.

The Wood White Butterfly in Co. Dublin.

When spending the day in Glenasmole on 2nd June last with Mr. G. E. C. Maconchy, I suggested we should keep a sharp look-out for the Wood White (*Leucophasia sinapis*) as it had in recent years been taken in Co. Wicklow. Scarcely had I uttered the words when Mr. Maconchy drew my attention to a small white butterfly fluttering feebly in front of us along the path. This upon capture proved to be a Wood White : it was taken near the N.E. corner of the upper reservoir. On the 10th June I captured another perfect specimen at the foot of Glenasmole (Boherabreena), while on the 25th of same month Mr. Praeger and I obtained a much worn example along the eastern shore of the upper reservoir, not far from the ruined church, and later in the day captured one and saw several in the little glen below Ballynascorney gap, above Boherabreena.

It would appear probable, therefore, that the Wood White is common in this district, though an addition to the Co. Dublin fauna. Mr. Halbert informs me that the species is supposed to have been extending its area of distribution in Ireland in recent years and it may possibly be a newcomer to Glenasmole. It may at once be distinguished from the other Whites by its small size, weak flight, the black apex of the forewings, together with the absence of spots on the wings. It appears in May and June.

A. W. STELFOX.

National Museum, Dublin.

Behaviour of a Fritillary.

On July 8, on a grassy hilltop near Hilltown, Co. Down, the curious behaviour of a Fritillary, which I believe to have been a Silver-washed, *Argynnis paphia* (of which I saw many in the district), attracted attention. It had a regular beat up and down a curved loose stone wall about 100 yards in length, flying low in the shelter of the wall, always crossing it at a certain point, turning at the top where a low cross-wall ran, and so back again. Occasionally a mate would appear, when the two would whirl up high in air and fly to windward till lost to sight ; but in a minute one—presumably the same—would return and resume its patrol. Presently it took to alighting at intervals on one or other frond of bracken about 12 feet from where I sat. Wishing to see if it would resume its regular beat if disturbed, I threw a stone near it to alarm it. The butterfly at once darted upwards like an arrow at the stone, and followed it right down

to the ground, so closely that it appeared to cling to it. I tried thirty or forty times with stones from half an ounce to a couple of pounds in weight, and each time the butterfly dashed from its perch at the stone and whirled down to the ground with it. Even when the stone passed the butterfly at a distance of 12 feet the insect saw it coming and sprang at it. Assuming that the movement was associated with the mating instinct, the butterfly had certainly very liberal ideas as to the possible variation in size and shape of other examples of its species. Had the passing object been an insect-eating bird, it might have been rough on the Fritillary.

R. LLOYD PRAEGER.

Dublin.

BOTANY.

Acaena Sanguisorbae an Alien Colonist.

I am indebted to Miss Knowles for kind identification of a plant that puzzled the members of the Dublin Naturalists' Field Club on their recent excursion to Lucan, when it was seen growing profusely among the grass and other herbage in a part of Captain Colthurst's demesne. It is *Acaena Sanguisorbae* Vahl, the Burnet-leaved Sheep's Burr, a plant too familiar to sheep farmers in Australia and New Zealand under the names "Bridgeewidgee" and "Bidi-bidi," which are said to be corruptions of a Maori name, "Piri-piri."

Though probably a garden-escape at Lucan (like *Artemisia Stelleriana* on the North Bull) this alien seems sufficiently strongly established to call for a record in the "Irish Naturalist," especially when we learn that it has already effected settlements in at least two districts in Great Britain—on Dartmoor (this is the only locality given by S. T. Dunn in his "Alien Flora of Britain," 1905) and on the banks of the Tweed (Hayward and Druce's "Adventive Flora of Tweedsdale," 1919). The authors of both the works just quoted (which were kindly looked up and shown to me by Miss Knowles) believe the plant to have been carried alike to Dartmoor and to Melrose by the power of its clinging seeds, but certain information as to the mode of transport seems lacking in every case.

The distinctive feature of this, otherwise very Burnet-like Australasian plant is the conspicuous burr formed by the globose fruit-head when flowering is over. Each calyx then develops two long sticky-tipped spines (Miss Knowles tells me that she found one or two cases of three, but two is certainly the usual number); and the burrs or "cuckens" (to give them their local name, in full use at Lucan) thus formed are sufficiently numerous and adhesive to explain readily why the plant is regarded as a serious pest by sheep-farmers in its native country. Judged by their tenacity in adhering to garments, I should say the burrs of *Acaena Sanguisorbae*

orbae were decidedly more troublesome to human pedes rian; traversing their haunts than are those of the Wood Sanicle, and only less so than those of either of our Bur-Marigolds.

Dublin.

C. B. MOFFAT.

I lately saw *Acaena Sanguisorbae* running wild in the grounds of Sir John Ross of Bladensburg at Rostrevor. There is a large collection of exotic plants there, many of which sow themselves near the parent, but this species has spread far outside the rabbit-wire enclosure into dry rocky woods, where it forms apparently a permanent member of the flora, among *Agrostis vulgaris*, *Teucrium Scorodonia*, *Digitalis purpurea* and so on. Sir John says it is spreading rapidly, and is a bad weed.

Dublin.

R. LLOYD PRAEGER.

Brachypodium pinnatum in Co. Dublin.

During the month of June while in Howth, I found what I thought must be *Brachypodium pinnatum*.

It was growing on both sides of the tram line, between Stella Maris station and the Summit, in gravelly soil, and varied considerably, some of the spikelets being branched. I do not know if it is naturalized or introduced. Having taken it to the Museum for verification, I found that it had not yet been recorded from Howth, so Miss Knowles suggested my sending a note to the "Irish Naturalist" as it might be of interest to some of its readers.

Dublin.

J. S. THOMSON.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

JULY 2.—DOWNPATRICK.—A party of 54 members left town in motor chars-a-bancs for the Downpatrick area, driving direct to Inch abbey via Saintfield and Crossgar. The President (S. A. Bennett, who was acting as conductor), gave a short and very interesting account of the history of the picturesque ruins.

From Inch Abbey the party drove to Raholp, via Quoile Castle, in order to visit the little church standing on a low mound, apparently originally a rath, about 100 yards off the road. Here the members were met by Mr. F. J. Bigger, M.R.I.A., who rapidly sketched the history of the building.

The next halt was at Lough Money cromleac, a structure which differs from the type, inasmuch as the cap-stone rests on two stones only, which stand parallel on edge, all the stones being of Silurian grit. From hence the motors took the members to Ballyalton stone circle, a much-ruined monument. From Ballyalton the members were driven rapidly into Downpatrick and to the Cathedral, where the courteous verger (Mr. M'Williams) acted as a very efficient guide.

Tea was served at Denvir's Hotel, English Street, at 5.45 p.m., after which, at the business meeting following, the President made feeling reference to the loss the Club had sustained in the recent decease of Mr. W. J. C. Tomlinson, a member of 20 years standing, and a botanist of great repute. The President proposed that a vote of condolence be forwarded to Mr. Tomlinson's family. This was seconded by Mr. N. Cartuthers and passed in silence, the members standing. After three senior and one junior member had been elected the meeting terminated.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 4.—PORTRANE.—A party of thirteen members and visitors travelled thither, under the conductorship of J. de W. Hinch. The road across the fields to the southern martello tower was taken, and when the shore was reached, the volcanic origin of the andesites was explained and its relation to the intrusive porphyry discussed. From this point the party proceeded northwards and examined the glacial deposits of the district. The earth-movements were then brought under notice and the "thrust-conglomerate" of the Priests' Chamber excited much interest. Mrs. Gregg was elected a member of the Club at a meeting held in the sand dunes during the excursion.

JULY 2.—LUCAN.—Leaving Kingsbridge at 12.30, a party of eleven proceeded first (by kind permission of Captain Colthurst) to Lucan demesne, and were shown by the steward (Mr. Early) through the extensive gardens and grounds, special attention being called to some of the older and more interesting trees. An alien plant (*Acaena Sanguisorbae*) which was seen growing in some quantity in the demesne forms the subject of notice elsewhere (p. 98). The party afterwards visited Mr. Shackleton's demesne, and were very kindly guided by the proprietor to the rath and subterranean chamber for which this demesne is celebrated. After tea at the Spa Hotel the party caught the 5.25 tram home. The best botanical find made—apart from *Acaena Sanguisorbae*—was a flourishing colony of *Mimulus guttatus* on the river Griffen, in Mr. Shackleton's demesne. This would seem to be the first instance of its occurrence in District 6 of Mr. Colgan's Flora of Dublin, where the range of the plant is given as 5, 7, 8.

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Natural History Department, Royal Scottish Museum.

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G. H. CARPENTER,

Royal College of Science, Dublin.

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NOTES ON DOWN AND DUBLIN PLANTS.

BY R. LLOYD PRAEGER.

I.—Co. Down.

Leontodon hirtus L.—This grows in rough grass in the grounds of Sir John Ross of Bladensburg. The place is famous for its collection of exotic shrubs and trees, and it is possible that the plant came with some of these; but the habitat resembles others for the same plant at Narrow-water and in the northern part of the county. It should be looked for in other stations about Rostrevor.

Cnicus lanceolatus Willd.—A plant growing in a field on the western slope of Rathfriland Hill presented the finest example of fasciation I have seen. The main stem was strap-shaped, 4 ft. 6 in. high and 5 in. wide throughout its length. It terminated in an extraordinary convoluted flower-head 6 in. long and about $1\frac{1}{2}$ in. wide formed of four complete S-turns, and measuring 16 in. along the curve. The lateral stems, which in this species mostly far overtop the main stem, were few and only half the height of the latter, and normal in structure. Curiously enough, only twenty feet away grew a *Cnicus palustris* which displayed the same characters though in a lesser degree. The main stem was similarly fasciate, about 3 ft. high and 3 in. wide; the terminal heads were several, but normal, and the lateral branches normal.

Matricaria discoidea DC.—Now frequent along roadsides in the Hilltown district.

Digitalis purpurea L.—The propensity of Foxglove to colonize ground from which trees have been removed is well known, but I never saw such a colony as occupies an area of some 10 to 20 acres from which the timber was cut towards the end of the war high up on the shoulder of the hill north of Rostrevor waterworks. The Foxgloves at the end of June formed a solid sheet of purple over the whole area, making a bright purple patch even as seen from the railway near Goraghwood, ten miles away. Sir John Ross of Bladensburg tells me there are a good many white-flowered plants among them.

Carex filiformis L.—Last year I drew attention (*I. N.*, xxix., 98) to the occurrence of this lowland sedge in quantity among mountain plants on the Garron Plateau in Antrim. A similar habitat in Down may now be added. The plant grows thinly over several acres of flat very wet bog (probably the site of a glacial lake) at the head of the valley of the Rowan-tree River, a branch of the Rocky River, above Hilltown. The elevation is about 1,000 feet. None of the interesting concomitants of the plant in its Antrim stations, such as *Carex pauciflora*, *C. irrigua*, *C. limosa*, is present. In its Down station it is accompanied by *Molinia coerulea*, *Menyanthes trifoliata*, *Carex rostrata*, etc.

Equisetum hyemale L.—In 1899 I recorded and figured (*I. N.*, vii., 117) a form of this Horsetail in which several alternate lateral cones were developed, one from each of the uppermost nodes, and I set down the abnormality as due to the destruction (by grazing animals) of the terminal cone, and consequent production of laterals as is so frequent in *E. palustre*. I refound the station, by the Rocky River near Hilltown (I had forgotten all about it) in June last and found a large colony with hundreds of stems, most of which bore lateral cones. Examination showed I was wrong in attributing the abnormality to injury. Some stems of which the terminal cone was not yet mature lateral cones were already being produced; other stems bore a withered terminal cone and mature laterals; in the majority the terminal cone had fallen off, apparently naturally, while the laterals were full-grown. It seems the usual course of events is that the terminal cone is produced first, and after it has faded, apparently frequently in the following season, the crop of laterals is produced. The lateral cones are mostly four or five in number, occupying the uppermost four or five nodes. They are mostly alternate, sometimes opposite, sometimes a pair springs from one point. They are all much smaller than the terminal cone, and are borne on very short slender stalks.

Equisetum litorale Kühlw.—A second Mourne station was found for this rare hybrid Horsetail—in and about the mill-dam by the Leitrim River half a mile S.E. of Hilltown. It was the form (var. *elatius* Milde) which I have already recorded (*I.N.*, xxvi., 141) from Rocky River.

II.—CO. DUBLIN.

Cnicus pratensis Willd.—Seen in June growing with *Eriophorum latifolium* in the second field below (S.W. of) Glenasmole National School (the old monastery in Glenasmole)—a large colony. This is an extension of Mr. Brunker's recently recorded station (*supra*, p. 79), lying about two-third mile to the north of it. Mr. Brunker's station is not new, Mr. W. B. Bruce having recorded the plant from the identically same spot eleven years ago (*I. N.*, xix., 155).

Eriophorum latifolium Hoppe.—Mr. Scully's note (*I. N.*, xxviii., 90) on the only Dublin station for this rare plant hardly does justice to its abundance there. In June Mr. Stelfox and I found six or seven large patches (the largest quarter to half acre in extent) between the line of the embankment of the upper reservoir in Glenasmole and St. Anne's Church. In these spots the plant was the dominant species, its short yellowish leaves forming a feature almost as distinct as its forest of long-stemmed tassels of fruit, which formed white patches conspicuous from the opposite side of the valley, half a mile away.

Carex pallescens L.—Abundant on the same area as the last. Clearly not so rare in this, its only Dublin station, as would appear from the records (see Colgan's "Flora" and *I. N.*, xxviii., 90).

Orchis O'Kellyi Druce.—Mr. T. A. Stephenson confirms this naming by Mr. Stelfox and myself of a Glenasmole orchis as the *O. O'Kellyi* of Druce, which occurs in Galway and Clare (and sparingly in England), but has not, I think, been recorded hitherto from eastern Ireland. The late Mr. Rolfe of Kew, a specialist in Orchids, thought it distinct at least in a segregate sense, and Mr. R. A. Phillips inclines to this opinion; but the Stephensons, the latest students of the group, look on it as a race of *O. Fuchsii* Druce, a segregate of *O. maculata* L. (*Journ. of Bot.*, lix., 122, 1921). It is recognizable by its very graceful slender form and its quite unspotted leaves and white flowers.

IRISH ICHNEUMONIDAE AND BRACONIDAE IN 1920.

BY REV. W. F. JOHNSON, M.A., F.E.S., M.R.I.A.

THE cold wet summer of 1920 was no better for Ichneumon Flies than for other insects, and, as a consequence, my list is not as long as it might have been. I was very unfortunate in the weather while at Portnoo, and my captures were but few. In spite of all drawbacks, however, I have three species to bring forward as additions to the Britannic List, which are as follows :—

1. *MICROCRYPTUS FEMORALIS* Thoms.—Poyntzpass, in July, at Hog Weed in my field. Dr. A. Roman who kindly determined this and other species for me, tells me he has since seen it from England.
2. *GLYPTA SCHNEIDERI* Krieger.—Portnoo, in June, on cliff. Dr. Roman says it is “probably” this species, which was originally described from the island of Borkum in the North Sea and has been taken in Sweden.
3. *MESOLEIUS FRATERNUS* Holmgren.—Poyntzpass, in my fields flying along the hedgerow. This species is near *M. fallax* Hlgr. but has no areolet (*vide* Holmgren “Monographia Tryphonidum Sueciae,” p. 173).

Sir C. Langham very kindly sent me a piece of wood bored by *Sirex gigas* in hopes that either *Sirex* or *Rhyssa persuasoria* might emerge ; *Rhyssa* alone emerged. A male was the first to appear on May 3rd ; this was followed by a female on May 6th and a second on May 9th. I unfortunately killed the male and first female, but I kept the second female alive and she lived till May 25th, i.e., 16 days.

At Lenaderg on June 5th Mr. Davies and I spent a long time watching *Rhyssa* at work, but we did not obtain any additional observations to those already published.¹

¹ *Irish Naturalist*, xxviii., p. 115.

In October there were a few fine days, and in the afternoon about 4 p.m. I found quite a number of Ichneumons flying about laurels and resting on the leaves. Mention will be found of the species met with in the following list :—

ICHNEUMONINAE.

Stenichneumon ochropis Gmel.—Poyntzpass, field, August, a large male.

Cratichneumon sicarius Gr. } Poyntzpass, field, May.

C. annulator Fab.

Barichneumon gemellus Gr. var. **opticlus** Gr. (the male variety with the scutellum entirely black).—Poyntzpass, field, May.

B. incubitor L.—Poyntzpass a male with white scutellum, teste Dr. A. Roman, taken in my field in August; a female on hill, September.

B. lepidus Gr.—Poyntzpass, field, by sweeping, August.

Ichneumon sarcitorius L.—Poyntzpass, field, July. Dr. Roman remarks that the bands on the abdomen of the male which in our specimens are stramineous or flavous are in Sweden white.

I. suspiciosus Wesm.—Poyntzpass roadside at Acton Wood in May.

I. terminatorius Gr. } Poyntzpass, fields, August.

I. albiger Wesm

I. insidiosus Wesm.—Poyntzpass, roadside, May.

Amblyteles armatorius Forst.—Poyntzpass, hill, September.

Platylabus pedatorius F.—Poyntzpass, females in garden at Hedge Parsley in May; males in field at Hog-weed in July. Var. **iridipennis** Gr.—Poyntzpass, males, in field, in June, female in garden in August.

Herpestomus brunnicornis Gr.

Phaeogenes ophthalmicus Wesm. } Poyntzpass, field, August.

P. fulvitarsis Wesm.

Dicaelotus pumilus Gr.—Portnoo, sandhills, July.

CRYPTINAE.

Microeryptus nigrocinetus Gr.—Poyntzpass, field August, a dark variety of the male, teste Dr. Roman.

M. brachypterus Gr.—Poyntzpass, field, August.

Orthopelma luteolator Gr.—Poyntzpass, bred from *Rhodites rosae* L. **Cecidonomus gallicola** Bridg.—Poyntzpass, field, August.

Pezomachus cursitans Gr.—Poyntzpass, hill, September.

Stilpnus gagates Gr.—Poyntzpass, on laurels, October.

Atractodes tenebricosus Gr.—Poyntzpass, field at Hog-weed, July, August

A. fatalis Forst. (*compressus* Thoms).—Portnoo, cliff, June.

A. croceicornis Hal.—Portnoo; I took three females of this rare species on the sandhills in June.

Exolytus laevigatus Gr. } Poyntzpass, at Hog-weed, in fields, in-

E. petiolaris Thoms. } August.

Spiloeryptus abbreviator F. var. **Hopei** Gr.—Poyntzpass, roadside, September.

Cryptus albatorius Vill. var. **titubator** Thnb.—Poyntzpass, field, May.

PIMPLINAE.

Xylonomus pilicornis Gr.—Poyntzpass, field at hawthorn, June.

Rhyssa persuasoria L.—Emerged May. Lenaderg, June.

Perithous mediator Fab. } Poyntzpass, field at Hog-weed, July.

Pimpla maculator Fab. }

Glypta fronticornis Gr.—Poyntzpass, field sweeping, August.

G. ceratites Gr.

G. genalis Moll.

G. haesitator Gr.

G. vulnerator Gr.

G. punctifrons Bridg.

Lissonota nigridens Thoms.—Poyntzpass, window, April.

Phytodiaetus coryphaeus Gr.—A dark form; Poyntzpass, garden, August.

P. obscurus Desv.—Portnoo, cliff, June.

Exetastes nigripes Gr. var. **elusor** Gr.

E. guttatorius Gr.

} Poyntzpass, field at Hog-weed, August.

} Poyntzpass, field at Hog-weed, August, the latter

plentiful.

TRYPHONINAE.

Exochus prosopius Gr.—Poyntzpass, field, August.

E. flavomarginatus Hlgr.—Portnoo, cliff, July.

Orthocentrus marginatus Hlgr.—Poyntzpass, laurels, October, both sexes.

Homocidus dimidiatus Schr.—Poyntzpass, field at Hog-weed, August.

H. pietus Gr.—Holmgren's var. 1, with scutellum entirely black, Poyntzpass, field, at Hog-weed, July.

H. pulcher Hlgr.—Portnoo, cliff, June.

H. tarsatorius Gr. female (var. = *Bassus insignis* Gr., Hlgr., exactly 'apiceque scutelli et postscutelli pallide flavis' ¹), Poyntzpass, lane, July.

Promethus albioxis Thoms.—Poyntzpass, stable window, August.

P. suleator Gr.—Poyntzpass, hill, September.

P. cognatus Hlgr.—Poyntzpass, field sweeping, August.

P. laticarpus Thoms.—Male, variety with scutellum black, Poyntzpass, field, August.

Tryphon signator Gr.—Portnoo, cliff, July.

T. brunniventris Gr. var. **incestus** Hlgr.—Portnoo, roadside, June.

Exenterus flavilabris Hlgr.

E. flavomaculatus Gr. var. **hostilis** Hlgr.

E. mitigosus Gr.

Polyblastus variitarsus Gr. (dark var.)

P. pratensis Gr.

P. rivalis Hlgr.

} Poyntzpass, in fields, in August.

¹ Holmgren: "Monographia Tryphonidum Sueciae" (p. 360).

Erromenus fasciatus Gn.—Portnoo, cliff, June.

OPHIONINAE.

Plectiscus eurystigma Thoms.	}	
Megastylus cruentatus Schiod.		Poyntzpass, at laurels, in October.
Diaparsus geminus Hlgr.		

Campoplex terebrator Forst.—Poyntzpass, at Hog-weed, August.
C. nitidulator Hlgr.—Poyntzpass, in garden, May.
C. foveolatus Forst.—Poyntzpass, both sexes on roadside, in May; in field in August.
C. erythrogaster Forst.—Poyntzpass, field, in June.
Sagaritis postica Bridg.—Poyntzpass, garden, August.
S. punctata Bridg.—Poyntzpass, field, May.
Cymodusa exilis Hlgr.—Poyntzpass, field, August.
Limnerium albidum Gmel.—Poyntzpass, two females emerged on July 12th from *Hyponomeuta padellus*.
L. xanthostoma Gr.—Poyntzpass, field at Hog-weed, July and August.
Omorga cursitans Hlgr.—Poyntzpass, field, August.
O. fasciata Bridg.—Poyntzpass, field sweeping, October.
Olesicampa fulviventris Gmel.—Poyntzpass, field, May and June.
Meloboris crassicornis Gr. } Poyntzpass, field, August.
Angitia rufipes Gr. }
A. cylindrica Bridg.—Poyntzpass, hill, July.
A. exaraleolata Ratz.—Portnoo, cliff, June.
Agrypon septentrionalis Hlgr.—Poyntzpass, May and June.
Mesochorus pictilis Hlgr.—Portnoo, cliff, June.

BRACONIDAE.

Bracon fulvipes Nees.	}	
B. erraticus Wesm.		Poyntzpass at Hog-weed, in fields, August.
B. atrator Wesm.		

Rhogas irregularis Wesm.—Poyntzpass, fields, sweeping, August.
R. geniculator Nees.—Portnoo, cliff, June.
R. nigricornis Wesm.—Poyntzpass, stable window, August.
Chelonus inanitus L.
Apanteles falcatus Nees. }
Micropilis Spinoliae Nees. } Poyntzpass, fields, August.
Microgaster globatus L. }
M. tibialis Nees. var. *luctuosus* Hal. }
Agathis rufipalpis Nees.—Poyntzpass, garden, May.
Meteorus jaculator Hal.—Poyntzpass, laurels, October.
Macrocentrus infirmus Nees.—Poyntzpass, sweeping, September.
Biosteres rusticus Hal.—Portnoo, cliff, June.
Alysia manducator Panz.—Poyntzpass, field sweeping, August.

Poyntzpass.

OBITUARY.

W. J. C. TOMLINSON.

The death of W. J. C. Tomlinson, which took place in Belfast at the end of June, removes yet another of the active group of workers who, since the demise of S. A. Stewart, have so well maintained the reputation of Belfast as a centre of botanical field work. It is eighteen years since Tomlinson made in this Journal his first contribution to botanical literature—a note on the occurrence of *Ranunculus circinatus* in Co. Antrim. During the intervening time his free time was devoted mainly to local field work, and his position on the staff of the Midland Railway allowed him ready access to the greater part of Antrim and Londonderry. The contribution by which he will be most remembered was his working out of the distribution of that greatest prize of the Ulster flora, *Spiranthes Romanzoffiana*. He showed that in the portions of Co. Antrim adjoining Lough Neagh this rare Orchid was locally abundant, and his description of large areas of damp meadow all dotted over with the fragrant flower-spikes of this rarity was enough to have made the mouths water of many European botanists who have never seen the plant alive. He also, in conjunction with Mr. Lilly, established the wide range of *Vicia Orobus*, over the elevated moorlands lying between Larne and Ballymena—a plant whose claim to inclusion in the north-eastern flora had for long years rested on the single clump discovered by S. A. Stewart at the Sallagh Braes. Many other interesting records remain to attest his love of exploration and his discriminating eye. Of recent years he suffered from an affection of the heart, which curtailed his activities. His death will be a serious loss to the Belfast Field Club, of which he was a leading member, and all Irish botanists will deplore the passing of yet another of their small band.

NOTES.

ZOOLOGY.

The Humble Bees of Lambay.

On the occasion of the visit of the Dublin Naturalists' Field Club on 27th July I made an attempt to add to the small list of species of Aculeate Hymenoptera recorded for Lambay. (See *Irish Nat.*, vol. v., p. 186, and vol. xvi., pp. 43 and 44). The day was dull and rain threatened so that a few Wasps and Humble Bees were the only species noted. In these groups *Bombus terrestris* and *Vespa sylvestris* were the only species previously recorded. On this occasion I took *Vespa rufa*

and *V. norvegica* in the garden at the castle, and Mr. Moffat found a nest of the latter in a tree near by. Of the "Bumbles," I captured in the garden, *Bombus lucorum*, *B. agrorum*, *B. muscorum* and along the northern cliffs of the island I noted these same three species, as well as *B. jonellus*, *B. distinguendus* (a single male) and *B. terrestris* (a single young queen). Of the inquiline genus *Psithyrus* I saw a single male of *P. campestris* in the latter locality. Mr. Moffat reported having seen one of the red-tailed bees on the other side of the island, but as it was not captured he was not sure whether it was *B. lapidarius* or *B. derhamellus*. The only ants noted by me were *Myrmica scabrinodis*, an already recorded species.

A. W. STELEFOX.

National Museum, Dublin.

Irish Birds.

In the July Number (*supra*, p. 82) Mr. Williams and Mr. Hinde comment on my notes on Irish birds published in the May issue.

To deal first with the Raven, my authority for the statement as to its rarity was Barrington's List of Dublin and Wicklow birds in the British Association Handbook, 1908, where he says it is a "Rare and decreasing species." As would appear from the letters, this is not now the case, a matter of congratulation to all bird-lovers.

The birds seen on the North Bull on March 13th were not, I am certain, either Sanderlings or Knots. I observed them very closely, and the following extract from notes made at the time may be of interest:—

"On the back of head . . . is a dark greyish band, reaching almost from eye to eye. A dark patch is also to be seen on the flanks. The legs are dull yellow." Neither Knots or Sanderlings have these markings, and their legs are not yellow, but black.

My record of a Yellow Wagtail on February 20th is perhaps open to doubt, but, as I am well acquainted with the Grey Wagtail in Dublin, I am confident my identification was correct. The snowstorm I referred to might account for its presence in a suburban road.

ATHOLE HARRISON.

Terenure, Co. Dublin.

Curious Behaviour of a Bat.

One evening late in July last I observed a large Bat hawking amongst the Swifts, whose sweeping flights it closely imitated. I had been watching it for, perhaps, a minute when it suddenly turned its face to the wind and commenced to flutter vertically upwards, as if climbing an invisible rope. After ascending for, perhaps, a couple of hundred feet it swerved as if caught by a different current of wind, then resumed its ascent, this time exactly overhead. Being now thoroughly interested I continued to watch its upward flight until its apparent size had dwindled to that of the gnats flying about six feet above my head. At this height, when

it was still plainly visible to me owing to the clear evening, it vanished utterly and instantly just as if it had flown into the rather low overhanging clouds, some of which rested against the Dublin Mountains at an altitude of about 1,800 feet. Except for a few cloudy patches the sky was clear and blue and the time few minutes to 10 p.m., summer time, i.e., about 8.30 p.m. "sun time." Probably it was the fairly stiff westerly breeze that made the bat's vertical ascent possible. I have never seen a bat behave in such a manner before; but, perhaps, this is due to want of observation. Can any one suggest what its objective was?

A. W. STELFOX.

Rathgar.

As Mr. Stelfox has kindly shown me his interesting note, I think I should add that I have on three occasions been witness to a singular ascending flight on the part of the same species of bat—for it is quite obvious from Mr. Stelfox's description that the subject of his note was the Hairy-armed Bat (*Nyctalus Leisleri*), our largest Irish species, which is generally the first to quit its retreat in the evening, and may often be observed flying in company with the swifts, as Mr. Stelfox describes.

At Ballyhyland, where this bat is not nearly so plentiful as it is near Dublin, I was fortunate in having one of its sleeping places from which Hairy-armed Bats could be seen taking flight any summer evening I cared to watch for a period of twenty years (1900-1919 inclusive). During a part of every summer the bats lived gregariously in this retreat (an old ash-tree), and their custom on leaving it was to fly away for some distance at a fairly low level; but on all occasions on which I saw the ascending flight it was performed by a solitary bat, living in a retreat of its own after the summer assemblage had broken up.

As the notes I took are from 15 to 17 years old, I think I am safest in quoting them as taken down at the time.

(1) September 15th, 1904.—Hairy-armed Bat flew from the old ash this evening at 6.17 (minute of sunset), and went very high in the air, almost like a Lark. The evening was dark and damp, with a drizzling rain.

(2) September 16th, 1904.—The Hairy-armed Bat flew this evening at 6.5 p.m., 10 minutes before sunset. Again went up very high, and was kept in sight for 1½ minutes after quitting ash. The day, like yesterday, was wet with thick drizzling rain.

(3) October 4th, 1906.—The first Hairy-armed Bat came out at 5.42, 9 minutes after sunset, and went zig-zagging up into the air till out of sight—this occupied 1½ minutes. (See notes for September 15th and 16th, 1904, when bat went up exactly the same way, and on all three occasions the evening was thick with drizzling rain).

As it is only in the last of these three notes that I use the expression "zig-zagging," I have to trust my memory on the question whether the ascents seen in September, 1904, were spiral, zigzag, or perpendicular,

but I think zigzag is nearest to the mark for all three. My impression clearly was that the bats hoped to find clearer air and more insects on the wing by mounting above the wet mist. It should be remembered that owing to its early and short period of flight the Hairy-armed Bat must live largely on day-flying insects that have not yet retired to rest when it comes out.

The sudden invisibility assumed by Mr. Stelfox's bat I am unable to explain, but I think the cause must have been meteoric rather than zoological. My own carried itself out of view by a quite gradual ascent, and took, when timed, 90 seconds to perform the task.

C. B. MOFFAT.

Dublin.

The Breeding of Squirrels.

According to some of our best known naturalists, the Squirrel, in England, brings forth its young about June, naked and blind, three or four at a birth. And it is also stated that the female is smaller than the male.

A very great number of Squirrels has passed through my hands for preservation. I have often found, upon examination, that they were in breeding condition in December, while females received later in the winter were pregnant. I am sorry I did not keep a record of the dates; but one female received on the 11th January, 1912, contained three well developed young. It appeared to me that these would soon have been born, unless, indeed, the Squirrel's gestation is delayed like that of the Roebuck and the Badger. I have also found that the adult female is as large as the male, in fact the finest and largest specimen I have ever received was a female. It weighed $11\frac{1}{2}$ ozs. and its total length was $17\frac{3}{4}$ inches, which is almost 2 inches longer than the measurement given by naturalists for the male. The above is just my experience and I hope it may be of some interest.

ALF. SHEALS.

130 Cliftonpark Avenue, Belfast.

From notes that have already appeared in the *Irish Naturalist* (vols. i., p. 127, x., p. 148, and xi., p. 188) it can be seen to be well established that young Squirrels are often born in April and sometimes in March, or even sooner; while there is reason for believing that the young families produced about midsummer or later are second broods. The late Major Barrett-Hamilton had collected a vast amount of information on this subject, which, but for his untimely death, would ere now have been given to the public in his still uncompleted "History of British Mammals"; but his general conclusions were quite in accord with those suggested by Mr. Sheals.

C. B. MOFFAT.

IRISH SOCIETIES.

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Recent gifts include a young female Mandrill from Sir Frederick Moore, a White-crowned Mangabey and a Civet Cat from Mr. T. A. Finch, a pair of Blue Rabbits from Dr. R. R. Leeper, a Rabbit from Mr. R. Atock, a pair of Rabbits and a Guinea-pig from Miss Costello, nine Guinea-pigs from Mr. and Miss Byrne, Guinea-pigs from Miss Collard and Mr. J. W. Roberts, two Toggenburg Goats from Miss Vize, a Peba Armadillo from Col. J. Forrest, a pair of Bullfinches from Mr. W. W. Despard, a Blue and Yellow Macaw from Mrs Perceval, a pair of Budgerigars from Miss Sheila Flood, a Piaper and a pair of Pheasant Cuckoos from Mr. H. E. Rogers, a Peacock from Mr. C. V. Deane-Drake, a Silver Pheasant from Mr. A. N. Sheridan, a Herring Gull from Mrs. Morgan, a Tortoise from Mr. E. Boler, three Tortoises, four green Lizards and four Slow-worms from Prof. A. F. Dixon, Loach and Crayfish from Mr. A. W. Bretland, and Crayfish from Mrs. O'Callaghan.

A young male Chimpanzee, two Mona Monkeys, two Hussar Monkeys, a Green and a Hocheur Monkey, a Macaque and a Bonnet Monkey, two Sooty Mangabeys, a Guinea Baboon, a pair of Pacas, twelve Rabbits, eight Quaker Parrakeets, a Spotted Eagle Owl, and three Toucanettes have been purchased. A Lesser White-nose Monkey, two Marmots and a Grey Parrot have been received on deposit. A Zebu Calf has been born and ten Canadian Geese hatched in the Gardens. The newly acquired young Chimpanzee, named "Roger," is a most attractive little creature, very playful and gentle.

BELFAST NATURALISTS' FIELD CLUB.

JULY 30.—EXCURSION TO GALGORM CASTLE.—A party of 59 members left town in motor chars-a-banc for Galgorm Castle, driving by Lisburn, Glenavy, Antrim, and Ballymena. Unfortunately heavy rain somewhat marred the day, becoming torrential when Galgorm village was reached. Here, however, Mr. A. Raphael had thoughtfully thrown open the schoolhouse and lighted a huge fire, around which the members were soon gathered discussing lunch. At the business meeting following nine members were elected, and the President (S. A. Bennett, B.A., B.Sc.) voiced the appreciation of the members of the kindness of the Right Hon. W. R. Young, D.L., in throwing open the castle and demesne for their inspection. Following this the Vice-President (Rev. W. R. Megaw, B.A.), who was acting as conductor, gave a short account of the history of the castle. The members adjourned to the demesne, but were obliged to make the visit very short on account of the persistent rain. Mounting the motors Antrim was soon reached again, when tea was served in Hall's Hotel. After tea the party visited the Round Tower (by kind permission of Miss Clarke), and Rev. W. A. Adams gave a short talk.

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G. H. CARPENTER,

Royal College of Science, Dublin.

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THE RELATION OF SONG TO NESTING IN BIRDS.

BY J. P. BURKITT.

THIS paper is a study in continuation of my article in the January issue of this magazine.¹ To observe accurately is hard, to deduce correctly is harder. But the result of about a thousand notes during the past year, combined with previous records ought to be of help in this subject.

Since the publication of "Territory in Bird Life" by Mr. H. E. Howard any new studies and ideas on the rationale of bird habits will, I conceive, be, for a long time to come, compared with the theories and data in that book. Abstracting my notes has been such a considerable labour that I have not attempted to consider "survival" or other values.

CHAFFINCH.—I shall begin with the Chaffinch, our most numerous bird. I dealt with ten nests altogether and more or less with fourteen males in an area around my house. Seven of the nests were from 20 to 50 yards from the next ; one later nest came within 14 yards. But most of the time there was no difficulty whatever in allocating the singer to the territory. One mateless bird had an interesting corroboration in the peculiarity of a double song. The general song of the country was also not omitted from observation. Of the ten nests eight followed a normal course, six of these being laid up between April 20th and 26th, two of them being rather late mating and were not laid up till May 3rd. The others were not normal, being as follows :—One pair after beginning a nest about April 20th must have had some disturbance, and the second nest was not laid up till May 6th. Another bird lost his first female (found dead) and was for a long time mateless, and the ultimate nest was not laid up till May 18th. Another pair disappeared after choosing a site for their nest. Three other males apparently remained mateless all through, though one of them at least had a temporary female once or twice.

¹ *Irish Nat.*, vol. xxx., 1921, pp. 1-10.

Earliest song is always foreshadowed by the well-known chirps in sets of three or two. The first song was January 26th ; it was generally incomplete. By February 11th song was general. The routine is to sing, then go clean away to feed, then back to territory to sing. By March 5th some early pairs could be noted. Nothing can be plainer than that the arrival of a female puts a brake on the song. Even if the female be only a very temporary companion this can often be noticed, but when she is a settled companion it is still more definite. The very earliest pairs seem to cease song quicker after pairing than the later ones. But song continues more or less strongly in the presence of a female when the mateship is not fully settled. And when the female is still a free lance and on the boundaries of a territory, the male seems to leave her and go to the centre of his territory to sing, as if to test her attitude to him in that way ; or it may just be more evidence of the strong impulse to sing at "headquarters." Of course under such circumstances he fights with neighbouring cocks who would be rivals for her. Song while reduced may not be entirely off till the nest is begun. All normal nests were begun in the first twelve days of April, hence there was no *general* song after then till June (see below), but nevertheless there was strong *particular* song from those males who remained longer or shorter unmated. I have suggested that song entirely ceases on nest building, but I do not think it is a hard and fast rule in all cases, or debars an occasional few minutes of song in some cases, especially at sunset. Such apparently exceptional song requires further clearing up than my notes afford. But the quantity of such song seems vague and small, while the song from still unmated males was absolutely clear and outstanding. There is no vestige of song after the young are hatched.

As the unmated males got mates there was by the middle of May hardly any song at all. But in the last days of May and first days of June there was an extraordinary revival of song (noted in previous years also). Some, if not all, of these new singers seemed to correspond in territory and perches with the earlier spring nesters, and would

therefore appear to be the same males. The young left the normal nests at the middle of May, which would just give the male parents time after feeding the young to be free again for this revival. This new song becomes very strong, but, strange to say, is absent at sunset, which, in the previous two months was far the best time to find song; it corresponded to the early spring song before mating. By the 11th June this rush of song was largely off and the song itself was beginning to be incomplete, and one heard instead the chirps of threes and twos which preceded the spring song. Also this June song I noticed was often made on the ground, which one never saw previously. On June 22nd was the last song heard in the country. The birds were more or less flocked by then. There is no evidence at all in this district of the existence of second broods such as the books suggest are normal.

Now as to hours of song. Up to the end of February the song was all in the morning, practically none in the afternoon or evening. During March there is more day song, but by the end of March and beginning of April the certain time to find all singers, including decadent ones, is just before sunset. One could nearly set one's watch by it; it only lasts for about 10 or 15 minutes. Unlike the Blackbirds, Thrushes, Robins and Wrens, there is never any later song. In regard to early morning the Chaffinches are never in the great dusk chorus of Blackbird and Thrush. They do not start till an hour or more later, that is to say about half an hour after sunrise. The same set of birds are heard at morning as evening.

In regard to fighting, no animosity was seen between pairs when out of their territory in neutral ground like a fowl yard. I have no note of any actual fighting later than April 7th (at that time all normal pairs would be settled). But where there was a still mateless male he continued to oust from his territory any male looking for food, but not any female doing the same. I did not, however, see any evident animosity by any male who had a mate and had got as far as a nest, thus giving the impression that he feared no risk of her abduction. When the time of feeding young arrives, the pairs do not appear

to me to be confined to their territories by any means, but to vary their search without any distinct opposition except from a mateless bird as above. An extraordinary onset could suddenly be observed on food which appeared connected with the beech buds just bursting into leaf. This was on the 29th April. Tree feeding before that was not pronounced. This was just a day or two before the hatching of the earliest young and it seemed as if the incubation were arranged just in time for this food. By the 22nd May ground feeding had displaced the former, but by this date the normal nests would have the young fledged.

The courtship of the Chaffinch generally takes the form of the male doggedly following the female from branch to branch and then an occasional flight when they click bill to bill. Mr. Howard has fully described courtship.

BLACKBIRD.—A few Blackbirds appear to be paired and others courting for several weeks before song begins. I have some reason from three or four cases to think that those very early pairs do not join in the subsequent song. The earliest song is in the third or fourth week of February. Song implies perching up, more or less in the open, contrary to the usual habits of the bird. The well-known noisy calls in the winter dusk, as the birds proceed to favourite roosting colonies, diminish at the commencement of song. Fewer birds congregate, that is to say, they are beginning to roost in their own territories. At any time in the season the amount of Blackbird song between an hour after sunrise and an hour before sunset seems never more than trifling. The really great chorus is always confined to 10 or 15 minutes in the dark dusk of morning and evening. And it is not until April that earlier evening song becomes noticeable, that is about an hour before sunset. Those few birds which are heard in any degree during the day appear to be either birds which are a long time getting mates or birds which late in the season are for some reason (possibly "residual song," see below) much more inclined than the average to warble in the day time. By the middle of March the chorus is in full swing at the two dusks.

From then to the end of March there was a fast waning of song. By the end of the third week in April there was practically neither evening nor dusk song. (It is all done by Thrushes). Some areas are completely silent, and any later song about me was a gentle occasional day warble from an odd bird. I ceased taking notes of such on May 21st and do not know when they ceased, but I know that there was no song whatever after June 6th. I know little about moulting but I saw a couple in moult between 12th and end of June.

Twelve pairs were more or less studied by me, five of them in greater detail. At least three of the twelve had disasters in nesting. The earliest nest was laid up on March 29th. The next four between the 9th and 13th April, which corresponds to the normal early nests here over many years. The latest was laid up about the 12th May. I was unable to satisfy myself about any definite relation of song to nesting. At least two of the pairs never sang at all as far as I could note, unless a few times a month before eggs, even though one was near my front door. Two pairs sang a little before being laid up. Two others sang five and eleven days respectively before being laid up, and while little during incubation, their song continued more or less, even when feeding the young after leaving the nest. One was very evident as a mateless bird and the best singer round me, singing from March 5th to April 11th when he was paired. He made no subsequent song, but disaster happened to the nest on hatching, therefore the song relation is incomplete. The relation of song to nesting would be better studied where Blackbirds are scarcer than around me.

I have no evidence at all, in this or previous years, of second broods except where the first nest was destroyed. The English books say several broods are hatched. Howard Saunders says first broods are often hatched by end of March; ours would be fully three weeks later.

SONG THRUSH.—As a rule an odd Thrush can be heard any time from the beginning of the year. By February 4th song was very generally distributed, but judging by a

census of my own area, corroborated by general observation, the number of singers at this time of year is only one-third of those at the beginning of May (see below). The January song is mainly before 10 a.m. During the first three weeks of February the song changed from day song to be altogether evening song, but by the end of that time even this song had gone off as well as any early morning song. There were plenty of Blackbirds singing in the dark dusk of evening now but no Thrushes. All those Thrushes which used to sing and had ceased were now easily recognisable in pairs settled in their respective territories. I was dealing at that time with half a dozen such, and their subsequent nests, in my own area, and one or two elsewhere. There was no Thrush song inside my area from February 26th to the beginning of April. At the beginning of March however, a few new birds began to sing in the country round me, but this only lasted a few days. Thus there was practically no song anywhere to the end of March. In February the song in decadence seems to change first to evening, then to a few notes at dark dusk, and then ceases.

My observation of the individual pairs of that period is that their song entirely ceases very shortly after pairing. The normal early nests here are laid up in the last days of March. Song had ceased at least a month before. At the end of March there was also little Blackbird song (see above) and general Chaffinch song had waned, so that altogether there was a remarkable dearth of song then.

During the first week of April new singers are noted, in new sites, but in no considerable quantity till after the middle of April. From the latter time song seems to be confined entirely to evening (*i.e.* say from three hours to two hours before sunset) or to the two dusk choruses of morning and night. Such song is now all Thrushes' as compared with the middle of March, when these choruses were in full swing but all Blackbirds'. There is a regular gap between the evening and dusk song, and the latter has the more singers, while at *dark* dusk there is a sudden further increase of singers. This is a regular routine.

Eight new birds had started in my own area between

the 11th and 24th April, and by the first days of May the greatly increased number of Thrushes which sang either at dusk or dark dusk, made the singers so close together that one could not hope to tell with certainty to which territory or nest each singer might belong. I had therefore to regretfully conclude that further observations in such an area on the relation of song to nesting were futile.

I took therefore no more notes till June 5th when I found there was no dusk song whatever around me. I do not know when it ceased. There were still a few songs in the day and a few in the evening. June 22nd was the last date I heard a single song in the country. (I noticed a Thrush badly moulted on June 28th).

The early song of January and of three weeks of February, followed by the comparative silence of March and part of April, and the rising again to a high volume and great numbers towards the beginning of May seems to indicate (as one feels at the time) that there must be a great immigration in the latter period. I had not been aware of such immigration, but I have since been told that it is probable. The normal early nesters would be free to start new nests early in May and therefore, perhaps, to join in this May song, but this is only guess work. A certain amount of second brooding is evident.

The relation of song to nesting in the May birds may be different to that of the early birds, but I have to leave the solution of this to observers who have much fewer Thrushes than I. Some very late Thrushes which had young hatched out about June 8th had certainly not sung for a long time before that and did not sing afterwards; what then was the meaning of the singing birds who continued to the 22nd, unless they were mateless? The time of day in which these birds sang would be parallel to the early unmated birds. Therefore probably this June song, like the Chaffinch's, is of the type I call "residual" below. I have not referred to mateless birds much, because the early birds seemed to be all mated except a couple of males within half a mile radius of me who remained singing and apparently mateless and maintained their day song for from 15 to 28 days—quite

unlike the normal. And whether mateless birds had anything to do with the volume of May song I was unable to tell. But it is highly probable many of them did not breed, as otherwise I should have come across much more of subsequent breeding operations.

MISTLE THRUSH.—These birds shew signs of pairing in the beginning of January. The normal early nesters have the clutch laid up in the first days of April, but such birds had not sung for a long time previously—I am not sure how long. The 14th April was the last song I heard anywhere. There was thus no song connected with all the later nests, or second broods, which may not be laid up till say May 8th.

With reference to ending of summer song of Blackbird, Thrush and Missel Thrush, my dates above are—before June 6th, June 22nd, April 14th. Messrs. Alexander, as quoted in my previous article, give for S.E. England—fourth week of July and occasionally into October, third week of July and occasionally into early August, fourth week of May and occasionally into early August. I think my Blackbird and Song Thrush dates are normal here, but Mr. D. C. Campbell, writing from Londonderry, (50 miles north of us), in the July issue, 1921, gives his records for these birds in 1893 and 1894 as ending—for Blackbird 25th June and 18th July, for Song Thrush 22nd July, for Missel Thrush 20th and 23rd May. These were all about a month later than I have given. These are the more puzzling as his other birds of those years fairly correspond with mine of recent years.

Before passing on to song in general I may jot down a few somewhat irrelevant points about some other birds.

ROBIN.—No song here in at least three weeks of June and all July. Moultting can be seen in these months but chiefly in July.

WREN.—Complete song is as follows :—one beat, 5 quick double beats, 5 beats, twirl, 3 double beats. It is seldom finished complete I think out of the breeding season.

WILLOW WREN.—I have referred to mateless singers of this species before. I had one this year from April 27th to June 30th. Doubts have been expressed about knowing a mateless bird; but apart from other signs, surely failure to find him in any day of any month with any companion or feeding young proclaims his state.

RING DOVE.—That this bird has a perfectly regular song is, I suppose, well known, but I have never seen it even hinted at. It is in sets of "coos" 4, 5, 5, 1, as follows:—1234, 12345, 12345, 1. . The song is often incomplete. There is also the low double courting (?) note.

CORNCRAKE.—This bird seems to cease to sing when the brood is hatched. I have not precise data. Why does this bird when singing move the whole upper part of its head, instead of the lower mandible? Each bird round me seemed to require about 5 acres of suitable territory.

The overwhelming impression conveyed to me about song is—(a) the will to mate; (b) in a certain territory. By the will to mate, I would cover an interpretation, not necessarily confined to a mateless bird. Another important point which I would emphasize, as it has already been brought out by Mr. Howard, is that the *control* of breeding seems exercised by the female. It seems to me that it is mainly due to the discretion (speaking humanly) of the female and not of the male that the young are produced at suitable seasons, that some species have more broods than others, that in different parts of the kingdom the same species may vary in the number of broods. The males appear to desire to mate at many times but are not accepted by the female. This is mainly to my mind evinced by what I will term *residual* song but also by the attempts at courting or keeping in female company (out of the season) and by animosity between the males. This residual song means song that is not followed by breeding, and is made in greater or less quantity varying with the species, and with the season (summer, autumn or winter)

and with the geographical position. Thus residual summer song here may be normal song in S.E. England.

My propositions may be incorrect or at any rate very incomplete, but we are more likely to get at the truth by putting up some theory for criticism.

Taking residual *summer* song first, the first of what I may call abnormal song that we meet with is the lengthening of the normal period of spring song in the case of such males as find it difficult to get a mate. This song, as I have previously shewn, is a big thing (with us at least). It dwindles off as mates may be obtained, but some still may remain to be synchronous with the males of early broods re-starting to sing. This new song may be residual in one species and not in another, as in the Chaffinch and Greenfinch respectively; or it may be residual here but not so in south-eastern England where another brood is normal, as is apparently the case with Blackbirds and Thrushes, and Hedge Sparrows. I have above described our Chaffinch residual song at the beginning of June. South-eastern England seems to last a month longer and to have another brood. With the Greenfinch there is a new very large quantity of song here from mid-June through most of July followed by a lot of new nests in the beginning of July, and though a great many singers must remain mateless yet this song may in general be called normal. England has later song and more broods. Of the multitude of Yellowhammers singing here in July and lessening in the first half of August, very few appear to nest. Their summer song is therefore mainly residual. While the female Whitethroat is finishing the final feeding of its young in the hedges, the male may re-start to sing and court her, but she pays no attention. And as I have shewn in a previous article some of the long mateless males may be still singing up to now (and thus become synchronous with the former) and get a mate at the end of June, but such broods are few. The same exactly applies to the Willow Wrens at the end of June, but there is, as far as I know, no fresh breeding here, though there seems some temporary pairing. In England there is earlier hatching and later song and second brooding.

The Sedge Warblers have a very marked amount of residual song in the first 12 days of July; there are very few second broods. There is a considerable amount of Hedge Sparrow song here through June, perhaps more than at any other time, but as far as I know no fresh breeding results. There is a general renewal of Skylark song in June which corresponds with the time parents would be done with first broods, but I never knew of any nests at or after this. England seems a month longer and to have another brood. Fresh Grasshopper Warbler song can be heard regularly after rearing the first brood, but the supposed second broods have not yet been found by me, and Mr. Howard admits the same. I am not much in the way of Starlings, but I heard none sing after 28th March, implying that the song ceased before breeding, but in the last week of May I saw an odd bird sing near a breeding hole, but no notice was taken by a female.

As to autumn and winter residual song we also do not appear to have anything like as much as in the south of England, yet we have some. I would also draw attention to the evidences of a certain amount of pairing which is maintained right through the winter; also in non-singing birds, e.g., some of the Dabchick, Mallard, Widgeon, Jackdaws, and doubtless others. The more one looks through any available bird-records the more one sees evidences of a continuity of sexual feeling (to use a loose term) throughout the autumn and winter. Thus—Thrush nesting in November, Blackbird eggs in December and January.

My few autumn results are as follows:—Chaffinch song was heard three times in September and once in October, along with some of the triple chirps as in early spring. Some of these chirp also in early December. At the end of December I noticed a male and female Chaffinch regularly roosting together. Some call note is heard from the Hedge Sparrow in October, November, December, but it never develops into song as compared with the regular winter song recorded from south-eastern England; and Howard Saunders says it may be heard in the south of Europe all through the winter. Many Yellowhammer seem paired and taking a sexual interest from November onwards

though there is none of the proper song, only some of the single note. I heard Starling song at the end of September and frequently in early December. The song both then and in early spring seems invariably for attracting a mate by a single bird or by a bird separating himself from a flock. He generally stops when the female comes to him. I have seen attempted coition on such occasions several times in December and January. All through the winter many of the Wrens can be seen in pairs, but especially at roosting time (which is a regular song time for this bird as well as of the Robin). The proximity of the female seems at all seasons to tend to produce Wren's song, though there is plenty apart from her. Some Goldcrests appear to keep in pairs. I noticed much of their song at the end of October and end of December. At the latter time the song was regular at roosting.

I would conclude these notes by mentioning a very interesting bit of information I had from Mr. A. Holte Macpherson in reference to Willow Wrens in the west end of inner London. "Willow Wrens pass through this district in spring in fairly large numbers, but with the exception of a pair or two they do not stay with us more than a day or two, and are not to be seen or heard during the summer. About the middle of July they become quite common in London—more numerous than during the spring migration—and their song is often heard from then till end of August. This song is, however, weaker than that heard in spring. A good many but by no means all of the birds which invade London in July are young, distinguishable by their yellower plumage." Now my later Willow Wren singers cease song in the first days of July, and the following questions arise from this letter :—

1. Is the return journey started from here so early ?
2. Do migrants returning south sing on their way ?
(The general evidence seems to be that they do not sing on their way north to us).
3. If so, song and territory would seem detachable, at least in reference to residual song. Perhaps it is not residual in this case ; perhaps breeding results ?

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Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

NESTS OF THE ANT *STENAMMA WESTWOODI*,
DISCOVERED IN IRELAND.

BY R. A. PHILLIPS, M.R.I.A.

ACCORDING to Mr. H. St. J. K. Donisthorpe, author of "British Ants, their Life History and Classification," a standard work in which is summarized all that has hitherto been known of the habits and distribution of these insects, *Stenamma Westwoodi* (Steph.) West., is a rare species of obscure habits. It occurs in south and central Europe, the south and midlands of England, ranging from Cornwall to Norfolk, and a single specimen was taken at Kenmare River, Co. Kerry, by Mr. J. N. Halbert in 1898.

All the records for this ant in England and the majority of those for the Continent, refer to stray workers taken in or near the nests of other ants and among moss and leaves in woods and a few examples of the "sexes" mostly taken on the wing. Nests have been very rarely found. Donisthorpe in his book (p. 142), mentions only two. He says "Von Hagens once found an independent colony at Elberfeld, consisting of a deälated female and workers, and Wasmann another, situated under a stone in a wood at Laacher See (Rheinische Vordereifel) in August, 1889, some eighty workers being present, no female however being found." In neither of those colonies, it will be noticed, were the three "sexes" seen and no mention is made of larvae or pupae being present.

Donisthorpe also quotes André as writing (in *Spec. Hym. Europe*, ii., 312, 1881)—"It (*Stenamma*) occurs in shady places in woods and forests, nesting in the earth under moss and dead leaves, the nest being difficult to detect." No description or particulars are given of nests, if actually seen, in such situations.

The frequent occurrence of *Stenamma Westwoodi* in the nests of other ants has caused a diversity of opinion among myrmecologists as to its habits, some regarding these occurrences as accidental, others referring to the species as a guest-ant, and it has also been looked on as a myrmecophilous species; thus, F. Smith writing in *Ent. Ann.* 1863, 59, says:—"I am inclined to believe that *M. lippula*

(=*S. Westwoodi*) never constructs its own nest, but resides constantly with species of Formicidae."

The observations here recorded should therefore be of interest as proving conclusively, that in Ireland at any rate, *Stenamma Westwoodi* makes its own home, founds its colonies and raises its young quite independently of any other species.

On the 20th of May last I discovered two colonies of a small ant, each under a large flat stone in Mount Garret Wood near New Ross, Co. Wexford. The first consisted of about a dozen workers walking on the underside of the stone which rested on a loose layer of dead twigs and leaves. The second was a small nest in which about twenty workers and some larvae were seen. Specimens were sent to Mr. A. W. Stelfox of the National Museum, Dublin, who at once recognized it as *Stenamma Westwoodi* and its identity was subsequently verified by Mr. Donisthorpe.

Since then, in September, 1921, I took a worker and one male on the ground close to a nest of *Formica fusca* and another worker in moss shakings in the wood at Camlin, two miles south of New Ross. In the same month, in Killoughrim Forest, Co. Wexford, I discovered one nest with numerous workers and larvae, and another with a few workers only. All these habitats are old oak woods with a plentiful undergrowth of holly and brambles.

On September 17th Mr. Stelfox and I visited Mount Garret Wood together and in the space of a few hours examined over forty nests, most of which contained larvae, pupae, workers and one or more females (*i.e.*, "queens"). Males, varying in numbers from one to eight were also present in some nests. All the females seen were deälated, that is, having been fertilized, they had got rid of their wings. The number of adults in each nest varied between twenty and one hundred.

A few colonies, which may be regarded as abnormal, were also found, one, for instance, consisting of five males and one worker, another of one male and two workers; there were no larvae in either of these, and a third had six deälated females, two workers and some larvae.

Every nest we saw was situated under a stone, so tightly embedded as to preclude light and moisture;

usually in the centre when the stone was flat; or in the most inaccessible place when the stone was angular. The structure of the nest was similar in all cases; a central chamber roughly circular or oblong, usually about one inch across and a quarter of an inch in depth, with a few short side-galleries leading into subterranean passages, the whole roofed by the stone and covering a space of not more than two and a half inches square.

The central chamber, in which the young brood lies and is tended by the workers, is very carefully prepared, its floor being clean and level and coated with a thin bluish-grey material which, seen through a lens, has the appearance of a minute web-like fungus. We failed to trace any means of communication between the nest and the outside world, but it seems certain that the exit and ventilation are through one or more of the narrow underground tunnels.

When a nest is disturbed the workers wander slowly around, some seizing the larvae and carrying them singly or in bunches underground in a leisurely deliberate fashion.

No myrmecophiles were seen in the nests, but in a side-chamber in one we found three seeds of the Wood Sorrel (*Oxalis Acetosella*), and three eggs each of a different small snail,¹ neatly placed in a row. In another we found the remains of a beetle-larva that had probably been devoured by the ants, which apparently are carnivorous, as Mr. Donisthorpe, who now has a colony under observation in an artificial nest, writes, "they do not seem to care for honey, but eat dead flies, dragging them into the inner chambers of the nest." The only other ants seen in the wood were one colony of *Myrmica ruginodis* and a single stray specimen of *Donisthorpea mixta*, but these were not close to the nests of *Stenamma*. That the nesting habits of *Stenamma Westwoodi* differ in many ways from those of other British ants is evident from these notes, but much further and more detailed observation is necessary to elucidate the full life-history of the species.

Gardiner's Hill, Cork.

¹ Possibly belonging to *Vitrina pellucida*, *Hyalinia alliaria* and *Helix rotundata*.

THE EARLIEST IRISH ZOOLOGIST.

BY R. F. SCHARFF.

WE possess only a few fragmentary notes on the animals that inhabited Ireland in ancient historical times. From these no idea can be formed of the composition of our fauna as a whole at that period, although the cave researches have yielded some clues as to the larger animals which existed in this country along with the old inhabitants. The two earliest references to Irish animals both date from the 9th century. By far the most interesting of these is what may almost be called a zoological poem written in Irish, which was translated by Mr. Eugene Curry and incorporated in a paper by Sir William Wilde.¹ This poem contains the names of dozens of animals, some of which have never been identified. The second reference is rather vague and negative. St. Donatus, who died in the year 840, asserts that the bear, lion, snake and "noisy frog" did not exist in Ireland. Still even this meagre information is of some value.

About 300 years later (in the 12th century) Giraldus Cambrensis visited Ireland and describes several animals which he saw. It is interesting to note that he does not mention the bear, which we know must have been extremely abundant at the time when the Reindeer and Irish Elk lived in this country. We may assume therefore that it had already died out in the 12th century.

A much older note on the Irish fauna—like the others it is very fragmentary—does not appear to have been noticed before by Irish zoologists. It is a short reference by an Irish monk called Augustine dating from the 7th century. Nothing is known of his life or abode except his being of Irish origin. The value of his essay from a zoological point of view far exceeds anything written in the course of many centuries after his death for he attempted to solve problems which were not revived until about a hundred years ago.

¹ Wilde, W.: "Upon the unmanufactured Animal Remains belonging to the Academy."—*Proc. R. Irish Acad.*, vol. vii., 1860.

The writings of this remarkable Irish monk were published as an appendix to the third volume of the collected works of Saint Augustine, because they were formerly ascribed to that eminent divine. The volumes made their appearance in Paris in 1837 and the appendix is entitled "*De mirabilibus sacrae scripturae libri tres.*" The manuscript is known to have been written by "Augustinus hibernus" as he is sometimes called, in the year 655.¹

In the first part or book the author comments on the creation of heaven and earth, of the beasts, birds and fishes, and of man. He then dwells on the nature of the flood and on the accommodation provided for the beasts and birds in the ark. His acute observations tend to show that he was a keen naturalist who carefully pondered over all the difficulties connected with the biblical account of the origin of our fauna. I may be excused for quoting the exact Latin words of the author as in some cases I may have mistaken their correct rendering in English. On page 2726 the discussion is continued as follows:—

"*De animalibus quoque quae nec in terra tantum, nec in aqua tantum vivere possunt, quaestio vertitur, quomodo diluvium evaserunt, quales sunt lutri, vituli marini, et multum avium genera, quae in aquis escarum suarum victum requirunt, sed in arena dormiunt et nutriuntur, et requiescent. Si ergo arca includerentur sine aquarum adjumento vivere non possent: et si extra arcam remanerant, aquis universa tegentibus, ubi requiescerent quomodo haberent?*"

In other words Augustine was puzzled how such animals as the otter and the seal fared during the flood. If a pair of each had been taken into the ark they could not have lived, he thinks, without an ample supply of water. If they remained outside where and in what manner did they survive the flood?

What next follows constitutes the most interesting part of Augustine's speculations, for it directly concerns the Irish fauna and its origin. Many pages of the *Irish Naturalist* contain discussions on this subject, and it has been the principal aim of the writers to show that many of the animals now existing in Ireland could only have reached this country by means of a former land connection

¹ I am indebted to Mr. de Burgh of the Trinity College Library for permission to study this valuable work.

with Great Britain. It is assumed also that the latter country was united by land with the continent. The two islands would then have formed together a great promontory of the continent. These ideas were considered as altogether modern, and it was never dreamt of that an Irish monk could have held those views more than a thousand years ago. Yet such is the fact.

Augustine continues on page 2730 :—

“ Unde etiam insulas quae ab initio conditi orbis ut multi affirman^t non fuerant, processu temporis faciunt, dum propinqua promontoria marini finibus a continentali terra dividunt.”

I would take this sentence to mean that although many writers asserted that islands did not originally exist they no doubt were formed by promontories becoming detached from the mainland through marine action. In this manner he explains how animals which were originally members of a continental fauna came to be found on islands.

“ Per quod intelligitur, quod illae ferae quae insularum orbibus includuntur non humana diligentia devectae, sed in illa divisione insularum a continentali terra repartae esse probantur. Quis enim, verbi gratia, lupos, cervos et sylvaticos porcos, et vulpes, taxones et lepusculos et sesquivolos in Hiberniam deveheret ? ”

I believe I am right in translating these two sentences as follows :—It must therefore be assumed that the wild animals now found on islands have not been conveyed there by human agency. Who indeed could have brought wolves, deer, wild swine, foxes, badgers and little hares to Ireland ? Augustine was evidently not in favour of the view, maintained by some writers until quite recently, that the Irish fauna was introduced by man. Fortunately he had heard nothing about the Glacial Period which, according to some geologists, completely wiped out the previously existing animals of Ireland. The passage in Augustine's writings is of importance as a contribution to Irish natural history in showing that six kinds of large animals inhabited Ireland when he wrote this account in the year 655. Wolves and wild swine are now extinct in Ireland. Deer no longer roam about the country, although it is believed that some of the descendants of the old wild stock still live in the

large demesnes near Killarney. Only foxes, badgers and hares are still with us. If the term "lepusculus" refers to the rabbit it would indicate that this animal is probably indigenous. I cannot imagine why the author should have used this word if he meant "hare," as the ordinary Latin word is "lepus" not "lepusculus" which stands for leveret or little hare. What Augustine wished to convey by the word "sesquivolos" is not clear to me. "More than half-flying" animals might be the correct rendering of this word, which I cannot find in any dictionary. As I was writing this review of Augustine's essays Prof. Henry pointed out to me that the late Bishop Reeves had published an account of this eminent Irish monk.¹ On consulting this paper I find that the Bishop had alluded to the sentence just referred to and had translated "lepusculus" by hare and "sesquivolos" by rabbits or weasels. In a footnote Bishop Reeves acknowledges that the last word occurs nowhere else, and while translating it as above he submits the suggestion that it might have been "squirolus" denoting a squirrel. Indeed it is quite possible that the original word in Augustine's manuscript was wrongly transcribed. In any case I scarcely think we are justified in translating the word by either rabbit or weasel. Bishop Reeves treated Augustine's essays from a standpoint rather different from my own. He was more concerned with the writer's originality of thought and intimate acquaintance with sacred literature and expressed the opinion that from a theological point of view Augustine's essay is the most interesting relique of Irish learning.

A Swedish author, Mr. Nils von Hofsten,¹ refers to the writings of the Irish Augustinus, as he calls him, in the most glowing terms and speaks of him as having been the first to explain the discontinuous distribution of animals by the assumption of a former land connection between territories that are at present separated.

¹ Reeves, Rev. William: "On Augustin, an Irish writer of the seventh century."—*Proc. Royal Irish Academy*, vol. vii., 1861.

¹Nils von Hofsten: "Zur älteren Geschichte des Diskontinuitätsproblems in der Biogeographie."—*Zoologische Annalen*, vol. vii., 1916.

A man of the type of Augustine might have told us a great deal more about the Irish fauna. It is unfortunate he did not do so. He does not mention the Bear as still existing in Ireland in the year 655. The Deer he alludes to were presumably Red Deer, for it is probable that both the Reindeer and Irish Elk had already been exterminated. It would be interesting to know what the wild swine were like. It is certain that fierce wild boars inhabited the ancient Irish forests, and we are told also that small so-called wild swine abounded in the woods in the 12th century. The latter I believe were not truly wild swine but the feral descendants of an old domesticated stock. All these and many other zoological questions might have been answered by Augustine, who had a rare capacity for observation and was endowed with a surprising amount of learning and knowledge.

Knockranny, Bray.

IRISH SOCIETIES.

DUBLIN NATURALISTS' FIELD CLUB.

JULY 27.—EXCURSION TO LAMBAY.—Leaving Howth Pier soon after 12, a party of 33 members and visitors reached Lambay in a little less than an hour, and spent a delightful afternoon among the interesting birds and plants of that too rarely visited island. It was not, of course, to be expected that important discoveries would be made, considering how careful a survey had been made in the years 1905 and 1906 of nearly every branch of the island's fauna and flora; but it is clear from the captures made on this excursion by Mr. Stelfox of various species of humble bees and wasps (already recorded in this Journal, pp. 108-9) that plenty of work still remains to be done among even the most easily explored orders of the insects. Among the more interesting birds observed were the Raven, which is now known to be once more a regular breeder in this old but long abandoned resort, and the Peregrine Falcon, of which an example was noted in apparently immature plumage. The huge breeding colonies of Kittiwakes, Guillemots, and Puffins naturally attracted the largest share of attention; but the fact that a Spotted Flycatcher was seen near Lambay Castle may be worth noting, as this species is marked with a query in Mr. Patterson's list (*I. N.*, vol. xvi., p. 26). Some curiosity was aroused by the finding of a number of acorns dropped on wild ground, as if by birds, on the higher part of the island;

for as no oaks were seen of acorn-bearing age, the question suggested itself whether these acorns must not have been carried by birds from the mainland. The excursion concluded with a visit to the Castle, where the large party was most hospitably entertained by Mr. Baring and his family. The return to Howth was effected by about 8 p.m.

SEPTEMBER 10.—EXCURSION TO GLENASMOLE.—For this excursion 43 members and friends assembled at Terenure tramway terminus at 11.15 a.m., favoured by a remarkably fine morning after a night of heavy rain. The majority then proceeded in three good-sized brakes (others preferring to cycle), to the entrance to the Rathmines waterworks, dismounting at Mrs. Hely's, whence the walk round the lakes was begun. The lateness of the date was unfavourable for chances of seeing many of the rare plants for which the glen is so remarkable, but *Galium uliginosum* was seen in flower, and among those plants of interest that had passed the flowering stage both *Eriophorum latifolium* and *Carex aquatilis* were pointed out to the party while the Sweet-briar called attention to itself by its remarkable fragrance after some showers of rather heavy rain had descended. Mr. Stelfox, who conducted, also drew attention to two remarkable hybrid roses, of which it would appear that the parents are in one case *Rosa spinosissima* and *R. tomentosa*, and in the other *R. spinosissima* and *R. rubiginosa*—the latter, as he pointed out, being of special interest as indicating that the Sweet-briar has been for some time in possession of this habitat, where it also looks quite wild. Several interesting water birds—Wild Duck, Heron, Little Grebe, and one Cormorant—were seen during this walk. The party returned to Mrs. Hely's for tea at 4.30, and reached Dublin a little before 7.

BELFAST NATURALISTS' FIELD CLUB.

AUGUST 27.—EXCURSION TO MONLOUGH.—A party of 39 drove from town in motor char-a-banc and taxis as far as Carryduff, thence walking to Monlough. On reaching the lake side the botanists dispersed, meeting with a considerable amount of success. Among the birds noted may be mentioned the following :—Swan, Wild Duck, Heron, Coot, Grebe, Stonechat. The party reached the house of Mr. M'Williams at the foot of the lake about 4.30 p.m., glad to take shelter there from the persistent rain which had first met them on their arrival at the lake side. Mr. M'Williams and family had made every arrangement for their comfort, and the members of the party were appreciative of their kindness. After tea the usual business meeting was held, when six new members were elected. Reference was also made to the recent losses the Club had sustained in the deaths of Mr. Joseph Galloway, a member for 30 years; and Mr. Barton Sefton, a member for 18 years. The route to Ballygowan was resumed about 5.30 p.m., the programme being somewhat altered on account of the heavy rain, and in due time the members reached town again.

SEPTEMBER 10.—EXCURSION TO THE KNOCKAGH.—The seventh excursion was attended by forty-eight members and friends, who entrained for Greenisland at 2.15 p.m. The approach to Knockagh, the ancient name of which was Knocksciagh—*i.e.*, “The Hill of the White Thorn”—was over the links of the Greenisland Golf Club, thence by paths to the base of the mountain. Here R. Bell delivered a short, instructive address on the geology of the hill and district, in which he pointed out the irregular strata of basalt superimposed on the friable amygdaloid, which rests on another stratum of basalt, underneath which appears the chalk. The botanical section of the members found the flora of the hill interesting. Among the plants observed were the wood vetch (*Vicia sylvatica*) and the spindle tree (*Euonymus europaeus*).

From the summit, 903 feet above sea level, a magnificent bird's-eye view was obtained of Belfast Lough, its shores and surrounding hills, the Mourne Mountains, and Coast of Scotland. After tea a brief business meeting was held, at which, in the absence of the President (S. A. Bennett, B.A., B.Sc.) the chair was occupied by F. Adens Heron, J.P. The election of seven new members terminated the proceedings, after which a start was made for Greenisland Station.

SEPTEMBER 24.—EXCURSION TO DROMORE.—The ninth excursion took place, when 47 members visited Dromore. At the Cathedral they were welcomed by the rector of Dromore (Canon J. W. Cooke), who gave a most interesting description of the history of the Cathedral from the time of St. Colman, early in the 6th century, down to the present day.

The next halt was at the restored cross erected on the abutment of the bridge over the Lagan. This memorial is mentioned as standing in the reign of James I., and still bears traces of very beautiful Celtic interlaced ornament. After many vicissitudes it was finally re-erected on its present site by the exertions of the Naturalists' Field Club.

The Club was also responsible for the re-erection in the Market Place of the old town stocks, the next object visited. The stocks having been opened one of the bolder members voluntarily allowed himself to be incarcerated therein, this being considered the psychical moment for a photograph.

Passing the old castle, said to have been built about 1607, the party proceeded to the great Mount of Dromore, where the Conductor (Canon W. P. Carmody, M.A.) gave an interesting address on raths and earth mounds.

From the mount an adjournment was made to the church school-house, where, after tea, the usual business meeting was held. One junior and nine senior members were elected. The President (S. A. Bennett, B.A., B.Sc.) having suitably voiced the appreciation of the members of the party for the kindness shown by Canon Cooke on this the ninth and last excursion of the summer session, and having outlined the programme of the forthcoming winter session, the proceedings terminated, the members returning to Belfast by the 6.0 p.m. train.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 12.—The Club met at Leinster House.

J. G. RHYNEHART showed preparations of the head and jaws of the larva of *Triochcera relegationis* which he had found feeding in rotten turnip. He demonstrated the characteristic structure of the mandibles and maxillae, and pointed out the presence, in association with the conspicuous hypopharynx, of a pair of spinose lobes that might be regarded as maxillulae.

Prof. G. H. CARPENTER showed preparations of the thoracic air-tubes of Irish Hive-bees, in which adults, eggs, and nymphs of the small mite *Tarsonemus Woodi* were present. This mite has been recently described by Dr. Rennic (*Trans. R. Soc. Edinb.* vol. lii., 1920, pt. 4), as the causal organism of "Isle of Wight" disease in Hive-bees.

NOTES.

ZOOLOGY.

Gymnetron squamicolle Reitter, a Beetle new to the Britannic List.

On June 16th, 1902, I swept up in a damp spot at Glencar, Co. Kerry a red *Gymnetron* unknown to me, but which I was subsequently told was a red form of *G. beccabungae*. I accordingly recorded it as such (*Irish Nat.* xii., 1903, p. 65), but have always regarded this identification with considerable doubt, and have kept the insect in a space to itself in my cabinet. Recently I sent it with some other beetles to my friend Major Sainte Claire Deville, and he has returned it, stating that it is *Gymnetron squamicolle* Reitter.

Reitter described the species from Berlin *Verh. Naturf. Ver. Brünn* xlv., 31 (1907); it occurs in the south of Norway, and Major Deville takes it in France. He tells me he is not surprised that it has been taken in our Islands, and thinks it will be found in England, as well as Ireland. However this may be, the species has not been recorded from the British Isles heretofore.

G. squamicolle is a very pretty insect, the thorax is thickly clothed with yellow scales, the elytra are red with the base, suture and sides narrowly black, and the legs are red with black tarsi. I shall be interested to hear if this species is taken in any other part of Ireland.

HORACE DONISTHORPE.

Acherontia atropos on Lambay.

On the 11th instant a Death's head moth flew into the room of Miss Linehan, the housekeeper at Lambay, and was caught by her.

Bishopsgate, London

CECIL BARING.

Ravens on Howth.

In September 20th I saw a pair of Ravens on the southern cliffs of Howth and have seen and heard them about the same locality several times since. On enquiry I find they have been about Howth, probably since March last, but I have not been able to find out if they nested here.

In the *Irish Nat.* for 1907 (p. 27) it is stated that the Raven nested on Lambay Island until 1883, and in the Handbook of Dublin and District prepared for the British Association in Septem'yer, 1908, Mr. R. M. Barrington wrote of the Raven : " Rare and decreasing species. Used to breed at Howth (Hart) and on Lambay. A few pairs still nest in the Wicklow Mountains."

The Tansey, Baily.

DENIS R. PACK-BERESFORD.

The Song and Nesting of Birds.

Since my article in the October issue of the *Irish Naturalist* (*supra*, p. 113-124) went to press I have this September heard a great deal more Chaffinch residual autumn song, amidst a general chirping, chiefly in the second half of the month, on fine mornings and ceasing about 10 a.m. as in earliest spring. The song was sluggish and never made a proper twirl at the end. I did not give sufficient attention to be sure whether such singers had each a "headquarters" or incipient territory. Of course this song implied a break from the flocking, temporary or permanent. As I have indicated, some members of flocking species seem paired through the winter and then are more or less definitely separated from the flocks.

It is worth noting that in several species the stronger the mating impulse or the more it is unsatisfied, the more the song encroaches into the daytime. Hence there is a strong connection between mateless birds and much day song.

In reference to the occasion of song, I have elsewhere said that song may be made in alarm. Mr. G. C. S. Ingram writing on the Blackcap in *British Birds*, September, 1921, instances song when brooding on 11-day old chicks, and when fear of his presence prevented the male from feeding the young in nest, and when escorting a fledgeling in the bushes. I might assert that the first and third of these occasions shewed the will to re-breed as I have referred to in Whitethroat and Willow Wren, and that the second occasion was alarm, but would I be right ? Can we learn anything from caged birds ? Do they sing to an unnatural extent ? And if so, is it because they cannot fulfil their mating destiny ?

Enniskillen.

JAMES P. BURKITT.

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ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
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EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.
AND
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

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A Monthly Illustrated Journal of

NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A., Scot.,
THE MUSEUM, HULL,

AND

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The Irish Naturalist.

The Editors are glad to be able to announce that the publication of the "Irish Naturalist" is to be continued. In reply to Dr. Scharff's circular issued last month, such promises of support have been received that the guarantee fund has been considerably strengthened, while the Printers have volunteered to reduce the cost of publication during the coming year. For this generous action, as well as for the encouragement afforded by the guarantors, the Editors wish to express their hearty thanks. They would urge all readers of the Magazine to use their best efforts in increasing the number of subscribers.

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LIST OF THE DEPARTMENT'S LEAFLETS.

No	1.	The Warble Fly.	No	53.	The Construction of a Cowhouse.
"	2.	The Use and Purchase of Feeding Stuffs.	"	54.	<i>Out of Print.</i>
"	3.	Foot Rot in Sheep	"	55.	The Apple.
"	4.	Intensive and Semi-Intensive Poultry Keeping.	"	56.	Cultivation of the Root Crop.
"	5.	Celery Leaf-Spot Disease or Blight.	"	57.	Marketing of Fruit.
"	6.	Charlock (or Preshaugh) Spraying.	"	58.	Sprouting Seed Potatoes
"	7.	Fluke in Sheep.	"	59.	Testing of Farm Seeds.
"	8.	Timothy Meadows	"	60.	<i>Out of Print.</i>
"	9.	The Turnip Fly	"	61.	Field Experiments—Wheat.
"	10.	Wireworms.	"	62.	The Management of Dairy Cows.
"	11.	Prevention of White Scour in Calves	"	63.	" Redwater " or " Blood-Murrain " in Cattle.
"	12.	Liquid Manure.	"	64.	Varieties of Fruit Suitable for Cultivation in Ireland.
"	13.	Contagious Abortion in Cattle.	"	65.	Forestry: The Planting of Waste Lands.
"	14.	Prevention of Potato Blight	"	66.	Forestry: The Proper Method of Planting Forest Trees.
"	15.	Milk Records.	"	67.	<i>Out of Print.</i>
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"	19.	Early Potato Growing.	"	71.	<i>Out of Print.</i>
"	20.	Calf Rearing.	"	72.	<i>Out of Print.</i>
"	21.	Diseases of Poultry:—Gapes	"	73.	The Planting and Management of Hedges.
"	22.	Basic Slag.	"	74.	Some Common Parasites of the Sheep.
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"	24.	Care and Treatment of Premium Bulls.	"	76.	American Gooseberry Mildew.
"	25.	Fowl Cholera.	"	77.	Scour and Wasting in Young Cattle.
"	26.	Winter Fattening of Cattle.	"	78.	Home Buttermaking.
"	27.	Breeding and Feeding of Pigs	"	79.	The Cultivation of Small Fruits
"	28.	Blackleg, Black Quarter, or Blue Quarter	"	80.	Catch Crops.
"	29.	Flax Seed	"	81.	Potato Culture on Small Farms
"	30.	Poultry Parasites—Fleas, Mites, and Lice.	"	82.	Cultivation of Main Crop Potatoes
"	31.	Winter Egg Production.	"	83.	Cultivation of Osiers.
"	32.	Rearing and Fattening of Turkeys	"	84.	Ensilage.
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- 8. Destruction of Farm Pests.
- 12. Digging and Storing of Potatoes.
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- 19. Home Curing of Bacon.
- 21. Farmers and Income Tax.
- 23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

THE ESKERS OF IRELAND.

BY J. DE W. HINCH.

THE Eskers of Ireland have always attracted attention on account of their singular appearance in the great central plain, and the suggestions recently put forward by Prof. Gregory of Glasgow¹ to account for their origin have aroused considerable interest among those geologists who are conversant with the subject.

A satisfactory definition of an Esker is difficult to agree upon, as deposits which are merely irregular mounds of angular rocky material have been included in the term, and many of the older geologists applied the word Esker to any ridge of postglacial sand and gravel which showed signs of stratification. It is, however, in Ireland, usual to restrict the term to the winding steep-sloped ridges of water-worn sand and gravel which stretch for such considerable distances across the central plain, the most noted being the Esker Riada, the old boundary line between northern and southern Ireland. In form and linear distribution the Eskers vary greatly, and while some of the Eskers having the Esker Riada structure can be traced across country for considerable distances in a fairly straight line, there are on the other hand many hundreds of small Eskers with very little claim to definite form at all and whose longer axes show no connected general trend.

The Eskers are related to the great glacial deposits of stratified sands and gravels and must be regarded as the very latest of the late glacial series; in fact the formation of the Eskers must be considered as the closing episode of the Great Ice Age. Concerning the origin of Eskers there has been much discussion, and it must be said that the question still remains unsolved, and especially as regard the details. G. H. Kinahan regarded them as shoals and sandbanks formed by the tides and currents of the sea resulting from a postglacial submergence of the central plain, and showed much ingenuity in separating them into Fringe Eskers, Barrier Eskers, and Shoal Eskers, but his most enduring contribution to the subject is his recognition

¹ GREGORY, J. W. "The Irish Eskers," *Phil. Trans. Roy. Soc. Section B.*, vol. ccx., 1920-21.

of the fact that all the material encountered in the field was glacial drift which had been converted by degrees into sand and gravel, whether the sand and gravel occurred as the low undulating hills of the Curragh of Kildare or as the narrow sinuous mounds of the Esker Riada type.

As our knowledge of the glacial deposits of Ireland became more accurate the submergence theories connected with the Ice Age became untenable and the high-pitched gravel mounds of the Esker Riada type came to be regarded as casts of the subglacial or englacial tunnels which had been excavated in the ice sheet by percolating water. This theory which is usually connected with the name of Dr. Hummel, the Swedish geologist, who has made a special study of Eskers or Osar in Sweden, has been regarded with favour, both in Europe and America, as affording a satisfactory solution of the problem. In recent years an important modification of Hummel's theory was proposed by De Geer, who, while retaining the subglacial or englacial tunnel for the supply of the necessary water-worn material, considered that the stream issuing from the glacier should deposit its load under water in a lake or stretch of stationary water existing along the front of the ice sheet.

The possible or probable existence of these lakes or stretches of water in Ireland in late glacial times has been the subject of much discussion among Irish geologists, and various proposals for a lake in the central plain has been brought forward, whether as consequent on differential movement of the land at the close of the Ice Age or as the result of possible ice barriers closing the outlets of the central depression. No definite decision had been arrived at when Prof. Gregory in the paper under review proposed a return to a postglacial submergence, in order to obtain the necessary sheet of water required by De Geer's theory, evidence for which he considered to exist in the presence of the shelly deposits which occur in various localities and at various elevations in Ireland.

The proposal put forward by Prof. Gregory of a postglacial submergence of the central plain of Ireland in order to explain the origin of the Eskers must be regarded as revolutionary, and one which could only be accepted by Irish geologists after very deliberate consideration. Its

acceptance means that the principles and methods adopted in the investigation into glacial and late glacial deposits during the past generation will have to be abandoned, and a great deal of the work already accomplished by the Geological Survey of Ireland and other workers must be regarded as obsolete if this return to antique views is agreed to. Under these circumstances the evidence of submergence which Prof. Gregory proposes to rely upon will have to bear the strictest investigation as to its accuracy and as to its bearing on the immediate point under discussion.

It may be said at once that no such submergence can be imagined with our present knowledge of the surface deposits of Ireland, and that much of the evidence brought forward by Prof. Gregory has long been regarded by Irish geologists as proof that the districts in which they are found had been traversed by the ice sheets which deposited the marine shells in their present position. Most of the evidence produced by Prof. Gregory was collected before the true nature of the glacial deposits was understood, and some of it is merely inaccurate interpretation of the facts observed in the field, such as the confusion of attributing the kitchen-midden deposits of Tarmon Hill in the Mullet to a recent marine submergence. It is to be regretted that Prof. Gregory has not seen fit to examine any of the modern work done in glacial geology in Ireland, or if he has examined it, that he has ignored it so pointedly.

It can be stated with confidence that there are five areas in Ireland where marine shells and shell fragments have been found in abundance or in sufficient numbers to remove any doubt on the subject, in both the boulder clay and the overlying sands and gravels—Clare Island, North Mayo, Antrim and Down, the Counties of Louth, Meath, and Dublin ; and Wexford, Waterford and Cork. As the shelly drifts of Mayo, north-east Ulster, and south-east Leinster have no direct bearing on the proposed postglacial submergence of the central plain we need not examine them at great length ; they represent in each case the advance inland of an ice sheet which has crossed an inlet or strait of the sea either from the adjoining mainland or from another country, and the shelly deposits laid down are in all cases definitely limited in extent and do not point to submergence.

With regard to the shelly deposits of the ice sheet which invaded the eastern margin of the central plain, and which are usually quoted in support of the submergence theory we are in possession of a considerable amount of accurate information, as this area has been under observation for many years and includes the famous high level shelly drifts of Kilmashogue at 1,200 feet above sea-level, the equivalent in Ireland of the Moel Tryfaen deposits in North Wales on the other side of the Irish Sea.

If we examine the shelly drifts of Leinster we find that shell-fragments have been collected *in situ*, and undoubtedly *in situ*, in various localities east of a line drawn from Clogher Head in Louth, to Castlecomer in Kilkenny, and that in sheltered and favoured places it is possible with diligent and persistent collecting over long periods to find many specimens in a sufficiently good state of preservation for purposes of identification. The most noted of the collections made in this province are those made by Maxwell Close at Ballyedmonduff and Kilmashogue, by R. Ll. Praeger and Prof. Sollas at Kill-of-the-Grange near Kingstown (now Dunleary), and by the present writer at Larch Hill in the Dublin Mountains and at the Ford of Fine in the Naul Hills, the latter investigation being made with the assistance of a research grant from the Royal Society of London. About 45 species of mollusca have been identified in these collections, and include the usual percentage of arctic and northern forms, but it is essential to bear in mind that the number of shell fragments which have to be collected before even a short list of species becomes possible is very great indeed ; that as a typical instance, over four thousand shell fragments had to be gathered at Larch Hill in order to make possible a list of 42 species, and in other localities a similar proportion obtains.

What is the palaeontological value to be assigned to these many thousands of shell fragments found on the eastern edge of the central plain ? Are they sufficient evidence of the postglacial submergence which Prof. Gregory proposes for the formation of the Eskers ? The palaeontological value of these shell fragments is as follows : they are valuable evidence of the climate which existed in the Irish Sea area.

just before the advance of the Irish Sea glacier from the north, and they are also of value in distinguishing the glacial drifts in certain of the coastal areas from the Neolithic Raised Beaches, otherwise they must be classed among the erratics brought from the north by the Irish Sea Glacier, and are in no way different from the Ailsa Craig riebeckite, the Antrim flints and chalk, and the Lias fossils found along with them. They are in no sense palaeontological evidence for the proposed submergence, and, in addition, it has to be stated that many of the records of mollusca alleged to have been found in the glacial deposits westward of the line drawn from Clogher Head to Castlecomer must be regarded with a very active scepticism. Every case cited by Prof. Gregory has been gone into carefully and each case has been found to belong either to the area traversed by the Irish Sea glacier, or to rest on evidence of a very vague kind.

A postglacial submergence of the central plain having been excluded as being outside the limit of probability, can any alternative proposal for the necessary stretch or stretches of water be substituted? The facts which must be remembered in any discussion of the origin of the Eskers are:—that they are the final product of the decaying ice-sheet, that in this stage of decay the original direction of the ice-movement would have ceased to count, that the average height of the Eskers above the surface of the land is only from 40 to 60 feet, and that their structure is such that they may have been deposited in a comparatively short space of time. The causes required to produce them need, therefore, not be of any considerable geological importance. At the stage of the Esker period all the ground in Ireland over 350 feet would be ice-free and the extent of this ice-free ground would continue to extend as the ice sank lower and lower in the plain. The ice-sheet would then be in the final stages of dissolution and in thickness probably under 60 feet, except in Galway Bay, South Dublin and a few other lowland localities. In these districts the motionless ice would have melted much more slowly than the ice in contact with the warmer ice-free inlands and at the time of the formation of the Eskers

would probably stand so high over the level of the land as to block the drainage outlets of the central plain sufficiently to allow of the formation of lakes at suitable levels. The formation of this central plain lake is quite feasible and probably played a certain small part, but we are without knowledge of the lake terraces which should be formed under these conditions, and this proposal of a great lake must be regarded as a rather extravagant geological demand in order to account for the formation of such relatively small surface features as the Eskers. The remnant of the ice sheet lying in the central plain just before and during the formation of the Eskers must have been in a state of extreme decay, and it is probable that the stagnant ice would be traversed in many directions by tunnels and channels which might become filled with sand and gravel carried by the subglacial streams flowing through it. It is also possible that some of these many channels and tunnels, if empty at the time, might be filled from above when the upper level of the ice had sunk so near the level of the land as to break through the roof of the tunnel. In certain cases, and especially where the slope of the land surface was downhill it is probable that the edge of the local ice sheet ended in a stretch of locally ponded water giving rise to the type of Esker which requires this method of formation.

It is probable that no general method of formation was in operation during the whole period, that purely local and transitory factors produced many of the Eskers, and that it would be wise to remember that Eskers have been formed in other lands under conditions very different from those obtaining in central Ireland. A great literature on the subject has arisen in Sweden, Finland, and North America, and the student will find in Giles' recent paper,¹ to which my attention was called by Prof. Cole, F.R.S., Director of the Geological Survey of Ireland, an exhaustive series of arguments and an extensive bibliography on this very fascinating geological problem.

¹ GILES, A. W. "Eskers in the vicinity of Rochester, New York." *Proc. Rochester Acad. Sci.*, vol. v., pp. 161-240, 1918.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 9.—The Club met at Leinster House. PAUL A. MURPHY demonstrated the presence of a perennial mycelium in *Peronospora Scheideni*, Unger, the Onion Mildew fungus. This fungus which causes the well-known mildew of onions, is known to form its sexually-produced, thick-walled resting spores in the leaves of its host. These spores find their way into the soil with the decaying leaves, and it has always been assumed that the re-appearance of the disease in spring is due to the products of the germination of the resting spores. It has recently been shown by the exhibitor (*Nature*, Nov. 3, 1921, p. 304) that the parasite can also hibernate in the vegetative condition, that is, as mycelium, in onion bulbs. If such bulbs are planted and produce leaves, the latter may be permeated from the beginning with the mildew fungus. The internal parasite may show little or no sign of its presence until moist weather ensues about May, when it suddenly appears in the form of the well-known mildew all over the leaves. This method of hibernation has been observed in all the commonly-grown forms of onion—the common onion, the potato or underground onion and the shallot. The exhibit consisted of (1) the mycelium of *P. Schleideni* in the bulb during the winter period; (2) the same mycelium as it grows up with the developing leaf; (3) the conidiophores and conidia, or summer spores, which this mycelium produces in time on the surface of the leaves.

H. A. LAFFERTY exhibited preparations of *Thielavia basicola* as found growing naturally on Flax-roots in the field. Affected plants, when not killed outright in their seedling stage, remain small and stunted in appearance.

D. McARDLE showed a rare liverwort, *Blepharostoma trichophylla* in fruit; it is a remarkable plant, with the leaves divided to the base into three or four segments, each segment hair-like, erect, composed of from eight to twelve cells, stipules smaller than the leaves, tripartite. Perianth exserted white, composed of one layer of cells, mouth furnished with three or four teeth-like cilia. Capsule cylindrical, spores small, reddish brown, elaters long, narrow bispiral. This distinct species cannot be confounded with any other British one. The specimens were collected in Co. Kerry sparingly on decayed wood. It is also found in Co. Cork; it is rare in the north, as in Co. Galway, Co. Mayo, and on the east side at Lough Bray, Co. Wicklow, always found in small quantities not common in any known station; found also on the Continent and in North America.

BELFAST NATURALISTS' FIELD CLUB.

OCTOBER 26.—The President (S. A. BENNETT, B.A., B.Sc.) gave his inaugural address, taking as his subject "The Comber Estuary," a district, he said, which had been often visited by the club. The area is entirely covered by glacial gravel deposited in late glacial times. This spreads out

from Comber covering an area of about two square miles, mostly on the north side of the estuary of the present river. It represents the delta at the mouth of an overflow channel from the old glacial "Lake Belfast" of the Geological Survey memoir, and is to be correlated in time with the Lisburn esker, the Malone sands and clays, and the "dry gap" of Holywood. Haw Hill and Island Hill are to be regarded as the summits of "drumlins" of the earlier typical boulder clay of the district protruding through this later glacial deposit which is banked up against their sides. Narrowing the investigation to the area lying between the levels of the highest and lowest tides, he traced the effect of the estuarine conditions on the vegetation of that limited area which is occupied by typical salt marsh vegetation. The salt marsh plants, owing to the conditions of life under which they exist, exhibit a desert facies, and adaptations to these conditions, profoundly modify the root and leaf systems of the plants. The pioneer plant in the Comber estuary is the Glasswort (*Salicornia*), of which two species were described. As the level of the land rises other plants make their appearance, notably the grass *Glyceria maritima*, which forms a compact sward in which many of our most beautiful seaside plants find a congenial home. A short account was given of the formation of a salt marsh with its accompanying drainage channels and "salt pans." The *Festuca* meadow in the Comber estuary is replaced at higher levels by closed associations of *Juncus maritimus* or *Scirpus maritimus*. Where the water becomes fresher owing to drainage from the glacial gravels by which the estuary is surrounded, the reed grass (*Arundo Phragmites*) makes its appearance, and the lecture closed with a comparison of the Comber salt marsh with other salt marshes in the north-east of Ireland. The lecture was illustrated by a series of lantern slides, maps, and specimens of the plants discussed.

After a few remarks by the Hon. Secretary (A. M'I. Cleland), I. A. S. Stendall, M.B.O.U., and the Rev W R. Megaw, B.A., the proceedings terminated with the election of twelve new members.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 10.—The Vice-President in the chair. P. B. ROBERTS gave a paper with lantern illustrations on "Protective Devices in Butterflies and Moths." The paper opened with a brief outline of the life history of lepidoptera, emphasising the degree of activity, and other qualities affecting the preservation, and the dangers of each stage. The young, it was pointed out, were in high numerical ratio to the mature individuals, and, therefore, late stages needed most careful protection. Protective devices were discussed under the heads of devices with obliterative or hiding, and aggressive purpose. Stress was laid on the application of the methods under field conditions, and also on such points as the breaking up of outline, and prevention of a flat appearance, in obliterative methods. Finally a brief survey of habits, in connection with self-protection was given, and an attempt was made to compare the relative values of various means of protection.

NOTES.

BOTANY.

***Equisetum litorale* Kuhlw.**

In a previous issue (*I.N.*, xxix., 102), I referred to an unpublished station for this plant, when dealing with its occurrence in Co. Antrim. This third Irish station for the plant in Woodstock demesne, Co. Kilkenny. The plant grew in wet mud on the edge of the riverside avenue not far north of where the stream which forms the richly wooded glen joins the Nore. It was of the same form (var. *elatius* Milde), as I have already recorded from Antrim and Down.

R. LLOYD PRAEGER.

Dublin.

***Prunus Padus* in Wicklow and Kildare.**

During last June, in the Devil's Glen, about a mile below the waterfall, I saw some large trees of *P. Padus* (the Bird Cherry) in full flower, and subsequently observed that it was plentiful in this part of the glen, and so far as I could judge, native. The Bird Cherry does not appear to have been recorded for this part of Ireland. Miss Knowles when verifying my specimen drew my attention to another in the National Herbarium collected in Co. Kildare by Mr. W. B. Bruce : the label reads : "Wood, Castletown Estate, near Celbridge, Co. Kildare. W. B. Bruce. 23/5/1908. A tree 25 ft. high." Mr. Bruce evidently thought it native in Kildare also.

A. W. STELFOX.

National Museum, Dublin.

***Carex axillaris* in Co. Dublin.**

During the last two years I have seen this rare (hybrid) sedge in both stations referred to by the late Mr. Colgan in his Flora. At Malahide, though the new siding on the railway south of the station has destroyed almost the whole of the plant's former habitat, I found one plant of *C. axillaris*, after repeated failures, in May last. The Castle Bagot station is difficult to describe. About a quarter mile east of Milltown the road to Castle Bagot turns to the south, and just before the turn the main road crosses the stream flowing north from Castle Bagot. At the back of a wet ditch (along the main road) (leading from a cattle-pond in the angle of the two roads to the stream) and under the over-arching hedge, there is an abundant growth of *Carex remota*, and amongst this Mr. G. E. C. Maconchy discovered first one, then several plants of *C. axillaris*. The date of our visit was August, 1920. As Mr. Colgan points out, the Malahide

plant is more typical, having large robust compound spikelets at the base of the flower spike, while in the Castle Bagot plant the lowermost spikelet is alone compound and is much nearer *C. remota*. A root from this latter station in my garden produced two flower spikes this year, but set no seed, which supports the supposed hybrid origin of the plant, though at this place no *C. vulpina* was seen within a mile of the spot. At Malahide, the two parents (?) *C. remota* and *C. vulpina* grow intermixed!

A. W. STELFOX.

National Museum, Dublin.

ZOOLOGY.

Abundance of Red Admiral Butterflies.

I am sure everyone has noticed the extraordinary numbers of this handsome butterfly (*Pyrameis atlanta*) which appeared in October of this year. I have been accustomed to see a few, generally in September, but never have I seen such a crowd of them. They were everywhere, but resorted especially to Michaelmas Daisies and Ivy blossom. It was a glorious sight to see half a dozen or more of these lovely creatures, expanding their wings in the sunshine as they sucked honey from the flowers. With them were a few, very few, Small Tortoiseshells and numbers of the Speckled Wood. I saw on October 9th a Small White butterfly (*Pieris rapae*), sitting on a stone on the roadside, looking very much as if it had just emerged from its chrysalis, and could not quite understand the position. I was not able to observe it further, but I expect it soon found the use of its wings in the strong sunshine.

I was told of a single Painted Lady butterfly (*Pyrameis cardui*) being seen on some Michaelmas Daisies with the Red Admirals, but I did not see any myself. One would have expected an invasion of these along with the Red Admirals, but I have not heard of any number being seen. Where all these Red Admirals came from I cannot conjecture. They were fresh and unbattered, not at all like immigrants, so I suppose they were natives brought on by the wonderful summer.

W. F. JOHNSON.

Poyntzpass.

Two Aculeate Hymenoptera new to Ireland.

In connection with my work in the Museum I have paid considerable attention to this group of the Hymenoptera in the field during the past summer. In this work I have been assisted by a small grant from the Fauna and Flora Committee of the Royal Irish Academy. Amongst my captures are two species new to the Irish Fauna—*Agenia variegata* L., and *Osmia aurulenta* Panzer. The former belongs to the Fossores or

Digging Wasps and a single specimen was caught running over one of the large blocks of fallen calcrete in Glenasmole, not far from the entrance to the Rathmines Water Works, the date being the 13th of July. The latter belongs to a genus of bees hitherto unrepresented in Ireland, though numerous species occur in Great Britain. A single male was captured on the "Island," Malahide, on 21st May. The day was windy and unfavourable; but on the 24th of the month I had the pleasure of capturing both males and females in the same locality—about a dozen specimens in all. Besides its beauty, this bee is extremely interesting owing to the fact that it makes use of the empty snail-shells lying about the sand-hills, instead of digging burrows in the earth, wherein to rear its young. The shells of *Helix nemoralis*, are apparently the most popular, but I captured one female laden with pollen entering an empty shell of *Helicella itala*. In the latter shell the cells of the bee would of necessity be placed end to end. Unlike ordinary bees the Osmiae do not carry pollen on their legs, but they store it all on the under side of the abdomen.

National Museum, Dublin.,

A. W. STELFOX.

Donisthorpea mixta and D. umbrata¹, two Ants new to Ireland.

On May 26th, 1921, I discovered under a stone in a wood at Graigue-namanagh, Co. Kilkenny, a small colony of yellow ants which from their movements and large size seemed to me to be distinct from the common yellow ant (*D. flava*). On my sending specimens to Mr. A. W. Stelfox, he recognized the species as *Donisthorpea mixta* (Nylander).

Since then workers of the same species has been found near New Ross, Co. Wexford, and again at Graigue-namanagh (A.W.S. and R.A.P.); and a deälated female under a stone near Maryborough, Queen's Co. (R.A.P.).

In September, on the sandhills at Rosslare, Co. Wexford, I met with two large colonies of another ant of the "yellow" group, one containing numerous workers and a single winged female and the other, numerous workers and males evidently preparing for a marriage flight. Specimens from each were identified by Mr. Stelfox as *D. umbrata* (Nylander).

These two ants are widely distributed on the continent, and in England, extending their range into southern Scotland, but neither has hitherto been known to exist in Ireland. Mr. Stelfox's identification of each species has been verified by Mr. H. St. J. K. Donisthorpe, F.Z.S.

Cork.

R. A. PHILLIPS.

¹ *Lasius mixtus* and *L. umbratus* of most authors.

OBITUARY.

REV. CANON W. W. FLEMYNG, M.A.

In the death of Canon Flemyng, which took place at Coolfin, Portlaw, Co. Waterford, on 6th September last, in his seventy-second year, Irish naturalists have sustained a loss which will be difficult to replace. William Westropp Flemyng was educated at Trinity College, Dublin, where he took his degree of B.A. in 1871, and M.A. in 1874. He entered the ministry in 1880 for the curacy of Clonegam, and on the incumbency becoming vacant in 1883, he was appointed rector, so that his connection with the parish extended over a period of forty years.

At an early age he took a keen interest in natural history, and during his college days in Dublin explored the surrounding country for birds' eggs, butterflies and moths, and plants. On his appointment to Portlaw the new curate cannot but have been delighted with his surroundings, for the rectory adjoined the vast demesne of Curraghmore, the seat of the Marquesses of Waterford for many generations, and an ideal hunting-ground for all kinds of animal and plant life. Before long he had explored the woods, the heaths, and the fields of this delectable country and was able to record therefrom for the first time several rare creatures. Soon after settling down in his new home he made the acquaintance of the late R. J. Ussher, and accompanied him many a time in his excursions. Thus the Saltee Islands, off the Wexford coast, and the Islands of i'Kane off the coast of Waterford, were visited more than once, and a rich harvest of sea-birds' eggs secured. But Canon Flemyng aspired to be more than a mere collector. He acquired a library on the subjects dear to his heart, and kept his knowledge up to date by subscribing to the various journals of natural history. He contributed short notes to these magazines from time to time, and corresponded with some of the leading English entomologists, notably the late J. W. Tutt, for whose monumental work "A Natural History of the British Lepidoptera," he supplied a list of Waterford species. It is to be regretted that a man so accomplished and well versed in natural history, and having so many opportunities and such a rich tract of country at his door to explore, did not do still more to advance science. Perhaps it may have been for the want of a kindred spirit, or the sympathy that incites to great deeds.

It was in the nineties that the writer, then a youth, had the pleasure of first meeting with this charming country parson, and the friendship then formed was kept up through the years. Many happy hours were spent looking through his exquisitely arranged collections or hunting for rare lepidoptera in the woods of Curraghmore.

It was to Flemyng's guidance and encouragement that the writer of this notice was prevailed upon to take up the study of entomology in earnest, a study which has been to him a source of perennial enjoyment. The Bishop of Cashel, Dr. Miller, in a truly worthy funeral tribute, summed up Flemyng's life as "one of beauty, goodness, and truth."

L. H. B.-W.



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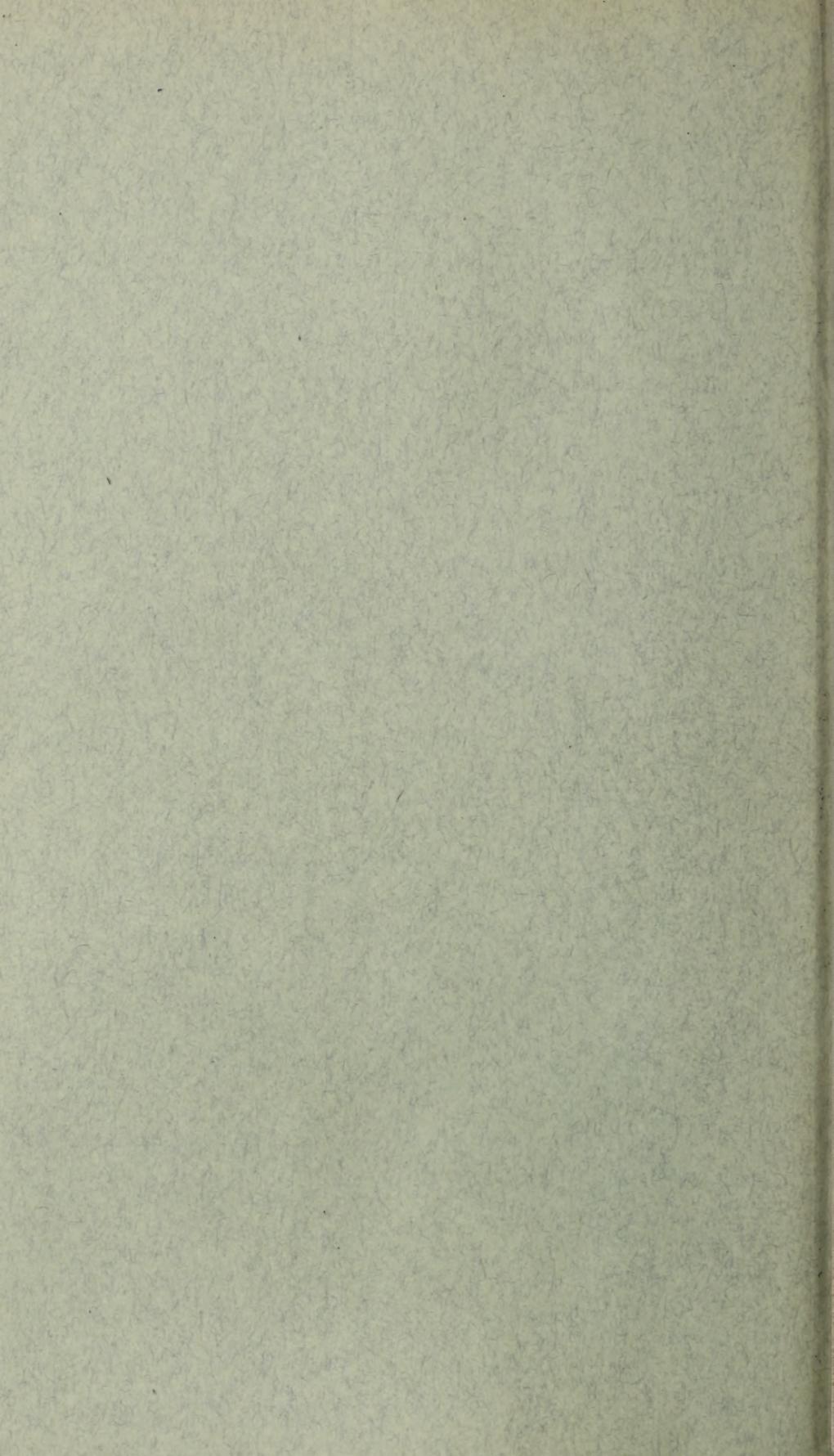
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